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PROBABLE TUBAL ORIGIN OF ENDOMETRIOSIS

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ON APRIL 4, 1898, W. W. Russell reported to the Johns Hopkins Hospital Medical Society a case of aberrant portions of the müllerian duct found in an ovary.¹ He described definite areas of endometrium with both glands and stroma situated in the substance of the right ovary removed from a woman in whom the left ovary was the site of a cystic adenocarcinoma. He further stated that some of the epithelial cells were ciliated and went with considerable detail into the embryology of the female genital tract, attributing the origin of this uterine mucosa in the ovary to aberrant portions of the müllerian ducts.

This communication did not appear until March, 1899, and meanwhile Von Franke² had published in July, 1898, a brief preliminary report of a similar case, but so far as I have been able to ascertain, Russell's report to the Johns Hopkins Medical Society was the first public presentation of a case of what today is widely known as endometrial cysts of the ovary.

In 1919 Casler³ reported a case in which after panhysterectomy for diffuse myomatous enlargement of the uterus the patient continued to menstruate through the vaginal vault. Examination of the removed uterus had shown the musculature penetrated everywhere by endometrial stroma but without glands. Three and a half years later the remaining ovary began to enlarge, and when removed four years after the original operation, was found to contain, in addition to normal ovarian elements, large quantities of typical endometrial tissue.

These three cases afford the only instances of endometrial or müllerian

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lerian tissue in the ovary to be found in the literature prior to 1921, and this notwithstanding the fact that during the period since Russell's original communication a very extensive literature had grown up around the subject of aberrant endometrial tissue, largely as a result of Cullen's exhaustive and prolific work on the subject of adenomyoma. The essential results of this work are summarized in his two papers on "The Distribution of Adenomyomata Containing Uterine Mucosa," published in 1919 and 1920 respectively.^{4, 5}

In 1921, however, the presence of endometrial tissue in the ovary was still considered a great rarity, as is made evident by the fact that Charles C. Norris,⁶ of Philadelphia, reported a single case which he considered very remarkable. He attempted to explain the finding upon an embryologic basis. The next year James C. Janney,⁷ of Boston, in an article entitled "Report of Three Cases of a Rare Ovarian Anomaly," described three cases of his own and collected from the literature the four others already mentioned. He also believed the condition to be very rare and considered aberrant embryologic rests of müllerian tissue as a source of origin of such misplaced endometrium.

Already in September, 1921, however, John H. Sampson,⁸ of Albany, had reported a series of 23 cases of "Perforating Hemorrhagic (Chocolate) Cysts of the Ovary" which he showed to be lined by tissue of müllerian or endometrial nature. He described in detail the pathologic and clinical aspects of these hemorrhagic ovarian cysts and also the associated pelvic adhesions containing endometrial tissue which he termed endometriosis. He believed that the areas of endometrium found in the pelvic adhesions were implants from epithelium escaping from perforating endometrial cysts of the ovary, but he made no attempt, in this first communication, to explain the origin of the endometrial tissue in the ovary.

Since his first paper in 1921, Sampson has kept the subject of endometriosis constantly before the profession, so that in gynecologic circles it has become one of the most extensively discussed subjects of the day. In May, 1922, he read before the American Gynecological Society a paper called "The Life History of Ovarian Hematomas (Hemorrhagic Cysts) of Endometrial (Müllerian) Type."⁹ At this time he reported 37 cases collected during the year May 1, 1921, to May 1, 1922. From the study of these cases he developed the theory that endometrial cysts of the ovary and pelvic endometriosis arise from implants derived "through or from" the fallopian tube. He further concluded that they may arise from either tubal or uterine epithelium, and histologically may be divided into three groups. First, those in which the characteristic uterine stroma is lacking and the picture is that of glands or tubules lined by ciliated epithelium, and in which the structure resembles that of the mucosa of a primary adenomyoma

of the tube, strongly suggesting that the implantations might have been derived from the epithelium of the fallopian tube. In the second group he put those in which there are both stroma and glands similar to normal endometrium, and in this group he states that the histologic picture strongly suggests that these adenomas were derived from uterine epithelium escaping through the lumen of the fallopian tube, or, in other words, from menstruation with a back-flow into the peritoneal cavity, or from portions of tubal mucosa which had reacted to menstruation. In the third group he placed those cases in which the picture suggested a mixture of adenomas of tubal and uterine type, or represented transitional stages from one to the other.

Thus Sampson early in his work on the subject was of the opinion that either endometrium or tubal mucosa might give rise to so-called endometriosis, and from the definition of his third group it would seem that he also considered the possibility that there might be a metaplasia of one of these types of epithelium into the other. The idea of retrograde menstruation, however, seems to have been the phase of the subject which has attracted the most widespread attention, and even Sampson in his later papers, although casually mentioning the possibility of a tubal origin from time to time, laid very little stress upon it, so that it was largely lost sight of until May, 1928, when he again presented the idea before the American Gynecological Society in a paper called "Endometriosis Following Salpingectomy."¹⁰

In this communication he presented a series of 30 cases of endometriosis arising from the tubal stumps and invading the surrounding tissues, collected from a series of 36 cases studied in which a previous salpingectomy or tubal sterilization had been performed. This subject interested me for two reasons: first, because I believed at the time that I had frequently seen pictures similar to those which Sampson described in uterine cornua and the walls of the isthmic portions of tubes from cases in which the tubes and cornua had been subjected to no previous operative manipulation.* In the second place, the possibility of ovarian and pelvic endometriosis arising from the transplantation and metaplasia of tubal epithelium, it seems to me, is a subject deserving more careful consideration than it has hitherto been given. It is with these ideas in mind that I have undertaken the following study.

I. ADENOMATOUS INVASION OF THE UTERINE CORNU AND TUBAL ISTHMUS IN CASES NOT THE SUBJECT OF PREVIOUS PELVIC OPERATIONS

During the year July 1, 1927, to July 1, 1928, I obtained sections from the isthmic portions of the tubes or from the uterine cornua from

*Cullen, in 1893, instituted the habit in our laboratory of obtaining sections from the cornua of all uteri removed, so that at the time I heard Sampson's paper, although I had made no careful study of the subject, I had casually observed a considerable number of such sections.

122 cases in which no previous operation had been performed upon the tubes. In the majority of these the uterus was removed, usually together with the tubes, for leiomyoma or other uterine pathologic conditions. In a small number (22) of the cases, however, the uterus was not removed but sections were obtained from the wedge of cornual tissue excised with the tube, which is the usual method of salpingectomy in our clinic. To secure uniformity the sections were taken in both types of cases from blocks just proximal to the cornual isthmie junction and thus containing the most distal part of the interstitial portion of the tube. This location further serves to meet the objection raised by Sampson, in the discussion of his paper before the American Gynecological Society in 1928, that the condition which he was describing was not to be confused with the usual conception of adenomyoma of the uterine cornu, which he claimed was located more deeply. The location which I have chosen for my sections I believe corresponds very closely to that from which his sections were taken for the study of tubal stumps. In some of my cases I also have sections from the isthmie portions of the tubes.

The study of these 122 cases reveals that in 37 of them, or approximately 30 per cent, the musculature of this region was invaded by more or less numerous tubules or gland-like spaces lined by columnar epithelium, a picture exactly analogous to that described by Sampson in his 30 cases following operative trauma of the tubal isthmus.* The only difference noted between my cases and those of Sampson is that in his cases there was often an extension of the process beyond the tissues of the uterine cornu and tubal isthmus into whatever tissues might be, as a result of the previous operative procedure, adjacent to these structures.

This leads, then, to my first point, which is that an operative trauma with a transplantation is not necessary for the production of aberrant adenomatous growths of uterine or tubal epithelium in the region of the uterine cornu. On the contrary, such growths are frequently present where the specimen has been subjected to no previous operative procedure, but in my experience are usually limited in extent by the peritoneal covering of the uterus and tube, though often approaching this covering very closely. The operative resection of the tube in such cases may very well, as Sampson has claimed, give rise to transplantation of bits of epithelium, thus resulting in an adenomatous process; but, on the other hand, it certainly breaks the continuity of the protective peritoneal covering and may thus give rise to a further advance of an adenomatous process already present.

*In a recent personal communication Sampson has suggested that the basis for reckoning percentages should be cornua rather than uteri, and in a series of cases not previously operated upon studied from this point of view he found a considerably lower percentage of glandular patterns than I have. In re-estimating my cases according to his suggestion, however, I find 31 per cent of glandular patterns or a slight increase over the percentage when calculated for uteri.

A careful study of the more minute histologic structure of these adenomatous formations is of considerable interest. The results of such a study are recorded in Table I. It will be seen by reference to this table that in 29 of the 37 cases the tubules or gland-like spaces were lined by characteristic tubal epithelium. This epithelium, as has been shown by Novak and myself,¹¹ is quite characteristic, and is distinguished by at least two types of cells; one large, clearly staining, ciliated, and nonsecretory; the other narrow, deeply staining, non-ciliated, and secretory. This is quite a distinct picture from that of the epithelium lining the endometrial glands which is composed of a single layer of columnar cells, uniform in type, all secretory at certain stages of the menstrual cycle, and nonciliated. The last statement is contrary to the accepted views which describe the uterine epithelium as ciliated, but the above authors in the study of numerous specimens, both by stained sections and fresh tissue preparations, similar to those used in the demonstration of cilia in tubal epithelium, have been unable to detect any evidence of ciliation of the cells lining the uterine glands, except in an occasional case of endometrial hyperplasia. Cilia, however, are usually present on some of the cells of the surface epithelium of the endometrium, but there is no evidence here of two distinct types of cells as in the tube.

In 4 of the other 8 cases, the tubules or gland-like spaces were typical endometrial glands lined by unmistakable endometrial epithelium, while in 4 others some of the spaces were lined by uterine and others by tubal epithelium. All of these 8 cases showed definite endometrial stroma surrounding the gland-like spaces, and in two of the 29 cases with only the tubal type of epithelium there was a loose cellular tissue surrounding the tubules, strongly suggestive of endometrial stroma.

The last 6 cases mentioned are to my mind most suggestive of certain possibilities. The simultaneous presence of aberrant epithelial tissue of both uterine and tubal nature, in a situation more closely approximated to the normal tubal lumen than to the uterine cavity, and where aberrant tubal epithelium alone is commonly found, strongly suggests the possibility of a metaplasia of tubal epithelium into endometrium. The presence of gland-like spaces lined by tubal epithelium but surrounded by endometrial stroma is even more convincing of the possibility of such a transition. These cases seem to me so important in the argument that a more detailed description of the individual cases seems worth while.

CASE 5.—Gyn. Path. No. 32562. E. M., aged twenty-seven, white. L.M.P.* July 22, 1927.

Operation.—Aug. 15, 1927, left salpingo-oöphorectomy; right salpingectomy; appendectomy.

*L.M.P. = last menstrual period.

TABLE I

NUMBER	AGE	RACE	OPERATION	PATHOLOGIC DIAGNOSIS	SECTIONS OF CORNU	SECTIONS OF ISTHMI	ENDOMETRIAL STROMA	TYPE OF EPITHELIUM	T = TUBAL E = ENDOMETRIAL	REMARKS
1	40	C	Supravaginal hysteromyectomy, appendectomy	Myomas of the uterus, interstitial; endometritis, subacute; chorionic villi and degenerated fetal tissue in uterine cavity	One	0	+	E	Tubes normal clinically	
2	21	C	Parovarian cystectomy, salpingectomy, appendectomy	Parovarian cyst; tube normal	Left	0	0	T	Section from resected wedge of cornu	
3	20	C	Left salpingo-oophorectomy	Salpingitis, chronic, left; tubal pregnancy ruptured, left, infected; normal ovary.	One	0	0	T?	Section from resected wedge of cornu; chronic inflammatory reaction distorting epithelium	
4	44	W	Hysteromyectomy (supravaginal), bilateral salpingo-oophorectomy, appendectomy	Myoma of the uterus; endometritis, chronic; salpingitis, chronic; T-O abscess, left; perioophoritis, chronic, right	Both	0	0	T	Interstitial portion of one tube lined by endometrium	
5	27	W	Left salpingo-oophorectomy, right salpingectomy, appendectomy	Perisalpingitis, chronic bilateral; peri-oophoritis, chronic, left; adenomyoma of uterine cornua	Both	0	+	T and E	Sections from resected wedges of uterine cornu; endometrial stroma with glands, some lined by tubal, others by endometrial epithelium	
6	40	W	Hysterectomy (supravaginal), bilateral salpingo-oophorectomy, appendectomy	Interval endometrium with endometrial polyps and tendency to hyperplasia and adenomyoma; salpingitis and perioophoritis, chronic, bilateral	Both	0	?	T	Epithelium definitely tubal; some of the glands surrounded by a questionable stroma	

TABLE I—CONT'D

NUMBER	AGE	RACE	OPERATION	PATHOLOGIC DIAGNOSIS	SECTIONS OF CORNU	SECTIONS OF ISTHMI	ENDOMETRIAL STROMA	TYPE OF EPITHELIUM	T	E	REMARKS
14	31	C	Panhysterectomy, bilateral salpingo-oophorectomy	Epidermoid carcinoma of cervix uteri; normal corpus uteri with interval endometrium; normal tubes and ovaries	Both	Both	One side	T			No salpingitis, so this cannot be used as an explanation of gland-like spaces in cornua
15	45	C	Hysteromyomectomy (supravaginal), bilateral salpingectomy, left oophorectomy, right oophorocystectomy, appendectomy	Myomas of the uterus; atrophic endometrium with retention cysts; salpingitis, chronic, bilateral; papillary cystadenoma, left ovary; atrophic right ovary	0	One	0	T			Not a representative case
16	38	C	Hysteromyomectomy (supravaginal), bilateral salpingo-oophorectomy, appendectomy	Myomas of the uterus; salpingitis, chronic, bilateral with chronic pyosalpinx, right; corpus luteum and follicular cysts of right ovary	One	Both	0	T			Cornu normal; gland-like space in both isthmi
17	38	C	Hysteromyomectomy (supravaginal), left salpingo-oophorectomy, appendectomy	Myomas of the uterus; fibrous degeneration of endometrium; normal tube and ovary, left	0	Left	0	T			Salpingitis, isthmica, nodosa, chronic, mild
18	25	C	Hysteromyomectomy (supravaginal), bilateral salpingo-oophorectomy, appendectomy	Myomas of the uterus; premenstrual endometrium; salpingitis, chronic, bilateral; adenomyoma of tubes and cornu; normal ovaries with small cysts in periphery lined by tubal epithelium	Both	Both	+	T and E			Transitional case; see complete description
19	39	C	Hysteromyomectomy (supravaginal), left salpingo-oophorectomy, appendectomy	Myomas of the uterus; late menstrual endometrium; salpingitis chronic left; corpus luteum cyst of left ovary	Left	0	0	T			Ovary contains inclusions of tubal epithelium, cystic

20 29 C	Hysteromyomectomy (supravaginal), left salpingo-oophorectomy	Myomas of the uterus; late interval endometrium; salpingitis, chronic, left, mild; corpus luteum hematoma, left	Both 0 0	T	Only slight scarring of left ampulla
21 33 C	Panhysterectomy, bilateral salpingectomy	Myomas of the uterus, interstitial, small; endocervicitis, chronic; adenomyoma of uterine cornu; salpingitis, chronic, bilateral, mild	Both 0 0	T	
22 44 C	Hysteromyomectomy (supravaginal), appendectomy	Myomas of the uterus; endometrial polyps; cystic endometritis	One 0 0	T	A bit of endometrium with stroma and glands found adherent to posterior surface of uterus Gland-like spaces in ovary lined by tubal epithelium
23 41 C	Hysteromyomectomy (supravaginal), bilateral salpingo-oophorectomy, appendectomy	Myomas of the uterus; endometritis, chronic, mild; salpingitis, chronic, bilateral, mild; normal ovaries	Both 0 0	T	
24 35 C	Panhysterectomy, bilateral salpingo-oophorectomy, appendectomy	Myomas of the uterus, submucous; interval endometrium; salpingitis, chronic follicular, bilateral; atrophic right ovary; atretic follicles, left ovary	One 0 0	T	Interstitial portion of tubal lumen lined by endometrium
25 53 C	Hysteromyomectomy (supravaginal), bilateral salpingo-oophorectomy, appendectomy	Myomas of the uterus; senile endometrium; small follicular cyst of left ovary; tubes and ovaries otherwise normal	Both 0 +	T and E	
26 32 C	Hysteromyomectomy (supravaginal), bilateral salpingo-oophorectomy, appendectomy	Myomas of the uterus; follicular hydrosalpinx, bilateral; follicular cysts of ovaries, bilateral; adenomyoma of uterine cornu, left	Both 0 0	T	Adenomatous picture in left cornu; lumen of interstitial portion of right tube lined by endometrium
27 23 C	Bilateral salpingectomy, appendectomy	Salpingitis, chronic, bilateral; salpingitis, isthmica nodosa, acute bilateral	Both 0 0	T	Sections from wedges resected from cornua show infiltration of polymorphonuclear leucocytes

TABLE I—CONT'D

NUMBER	AGE	RACE	OPERATION	PATHOLOGIC DIAGNOSIS	SECTIONS OF CORNU	SECTIONS OF ISTHMS	ENDOMETRIAL STROMA	TYPE OF EPITHELIUM	T = TUBAL E = ENDOMETRIAL	REMARKS
28	40	C	Hysteromyomectomy (supra-vaginal), bilateral salpingo-oophorectomy	Myomas of the uterus; adenomyoma of uterine cornu; interval endometrium; follicular hydro-salpinx bilateral; atretic ovaries	Both 0	0	+	E and T		
29	28	C	Bilateral salpingectomy, appendectomy	Salpingitis, chronic, bilateral; salpingitis isthmica nodosa	0	Both 0	0	T		Sections from uterine ends of tubes
30	29	C	Panhysterectomy, bilateral salpingo-oophorectomy, appendectomy	Endometritis chronic; partially bicornuate uterus with rudimentary right horn; salpingitis, chronic, old; follicular cysts of ovaries	Both 0	Both 0	0	T		Sections from cornual isthmic junctions; tubal inclusions in ovaries
31	34	C	Hysteromyomectomy (supra-vaginal), salpingo-oophorectomy, right	Myomas of the uterus; interval endometrium; adenomyoma of uterine cornu, right; tube normal, right; follicular hematoma, left	Right 0	0	+	E		
32	29	C	Hysteromyomectomy (supra-vaginal), right salpingo-oophorectomy, left salpingectomy	Myomas of the uterus; premenstrual endometrium; salpingitis, chronic follicular, right; hydro-salpinx, left; atresia folliculi, right ovary	Right 0	0	0	T		
33	34	W	Hysteromyomectomy (supra-vaginal), partial resection of left ovary, appendectomy	Myomas of the uterus; endometrial polyps; interval endometrium; adenomyoma of uterine cornu, left	Both 0	0	+	E		Adenomyoma uterine cornu, left side only; right side shows double tubal lumen in interstitial portion

				Both	0	0	T
34	50	C	Hysteromyectomy (supravaginal), right salpingo-oophorectomy, left salpingectomy, appendectomy	Myomas of the uterus; endometrial hyperplasia (localized); hydrosalpinx, bilateral, calcified ovary, right.			
35	43	W	Hysteromyectomy (supravaginal), appendectomy	Myomas of the uterus; adenomyoma of uterine cornu, left	Left	0	T
36	21	C	Right salpingo-oophorectomy, left salpingectomy, appendectomy	Salpingitis, chronic and subacute, right; hydrosalpinx, left; corpus luteum cyst and hematoma of right ovary	One	0	T
37	35	C	Hysteromyectomy (supravaginal), left salpingo-oophorectomy, right salpingectomy, appendectomy	Myomas of the uterus; menstruating endometrium; adenomyoma of uterine cornu of tubal type; follicular hydrosalpinx, bilateral; oophoritis, chronic, left	Both	0	T
							Adnexa normal clinically
							Section from wedge excised from cornu
							Gland-like spaces embedded in definite myomatous thickening; loose fragment of endometrium in one lumen

Pathologic Diagnosis.—Perisalpingitis, chronic, bilateral; perioöphoritis, chronic, left; appendicitis, chronic; adenomyoma of uterine cornua.

Description.—The tubes and left ovary are covered with adhesions but the endosalpinx in the ampullary portions of the tubes is essentially normal. In the substance of the ovary are several small spaces lined by tubal epithelium. Sections

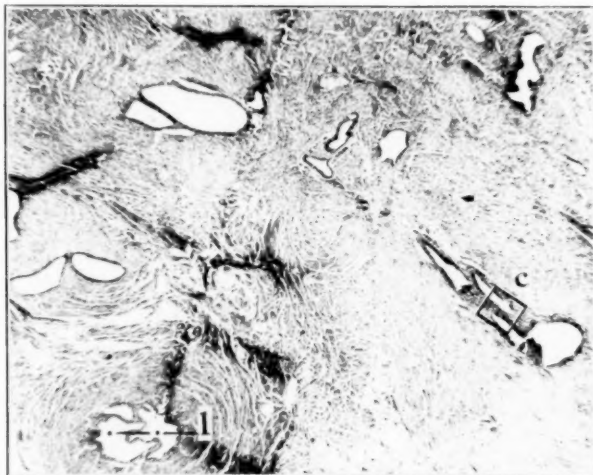


Fig. 1.—Gyn. Path. No. 32562. Photomicrograph ($\times 40$) of a section through the wedge of cornual tissue removed with the tube in performing a salpingectomy. Cross-section of the tubal lumen is seen at *l*, divided into two portions by a mucosal septum. Scattered throughout the myometrium between the lumen and the serosal surface are numerous glandlike spaces lined by epithelium.

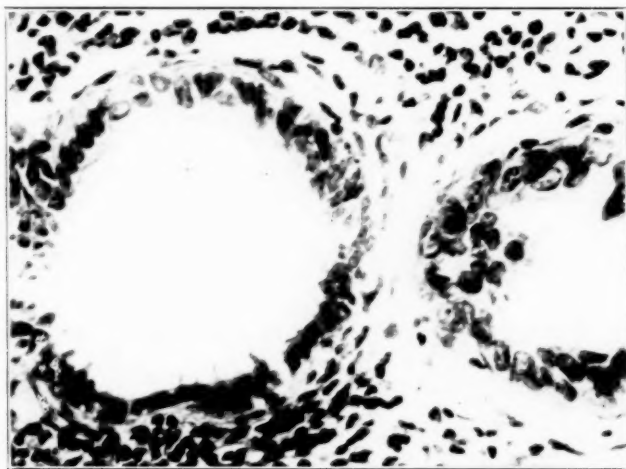


Fig. 2.—Gyn. Path. No. 32562. Photomicrograph ($\times 660$) of another area from same section as Fig. 1. The epithelium here is tubal in type (the cilia can be clearly seen in the more centrally placed gland) but around the glands is a loose cellular stroma resembling that of endometrium.

taken from the wedges resected from the uterine cornua during removal of the tubes show the same condition on both sides (Fig. 1). The interstitial portion of the tube is definitely demarcated by the circular and longitudinal layers of smooth muscle fibers which are quite distinct from the surrounding myometrium. The

lumen is lined by typical tubal epithelium and is divided into two portions by a mucosal septum stretching across it. In the surrounding myometrium are numerous gland-like spaces, some of which are lined by tubal epithelium and are not surrounded by any suggestion of endometrial stroma. Other similar spaces are also lined by tubal epithelium but are surrounded by definite endometrial stroma (Fig. 2), while still others are surrounded by stroma and are also lined by typical uterine epithelium.

CASE 6.—No. 32579. B. G., aged forty, white. L.M.P., Aug. 7, 1927.

Operation.—Aug. 20, 1927, posterior colporrhaphy; supravaginal hysterectomy; bilateral salpingo-oöphorectomy; appendectomy.

Pathologic Diagnosis.—Interval endometrium with endometrial polyps and tendency to hyperplasia and adenomyoma; salpingitis, chronic, bilateral; perioöphoritis, chronic, bilateral; appendicitis, chronic.

Description.—Sections from both uterine cornua taken near the cornual-isthmic junction show similar pictures. The tubal lumen is small, slit-like, and lined by tubal epithelium. In the myometrium are many gland-like spaces lined by columnar epithelium, which by the presence of both ciliated and non-ciliated cells is easily recognized as tubal in type. Some of the spaces, however, are somewhat dilated and in these the epithelium is so flattened that its normal characteristics are not easily distinguished. Several of the spaces are surrounded by a loose connective tissue with many round cells. This may be merely a lymphoid infiltration, but it strongly suggests endometrial stroma. Some of the gland-like spaces are very near the serosal surface, and most of them are situated between the normal tubal lumen and the serosal surface rather than more deeply.

CASE 14.—No. 32786. C. E., aged thirty-one, colored. L.M.P., doubtful.

Operation.—Nov. 7, 1927, panhysterectomy; bilateral salpingo-oöphorectomy.

Pathologic Diagnosis.—Epidermoid carcinoma of cervix uteri; normal corpus uteri with interval endometrium; numerous gland-like spaces lined by tubal mucosa in both uterine cornua; tubes and ovaries normal.

Description.—Sections are taken from the cornual-isthmic junction on both sides. In one of these the lumen is greatly dilated and the epithelium much flattened. Surrounding the lumen, however, are numerous glands-like spaces all lined by tubal epithelium and some of these are surrounded by a thin layer of stroma very suggestive of endometrial stroma. In the section from the other side the lumen is small and there are also numerous gland-like spaces. These are all lined by epithelium which is definitely tubal in type and there is no suggestion of stroma. There are in this section, however, a few small foci of round cell infiltration.

CASE 18.—No. 32914. J. K., aged twenty-five, colored. L.M.P., Nov. 22, 1927.

Operation.—Dec. 15, 1927, supravaginal hysteromyomectomy; bilateral salpingo-oöphorectomy; appendectomy.

Pathologic Diagnosis.—Myomas of the uterus, interstitial and subserous; premenstrual endometrium; salpingitis, chronic, bilateral; adenomyoma of tube and uterine cornu, unilateral; ovaries normal; appendicitis, chronic.

Description.—In the uterine cornu on one side and the isthmus and ampulla of the tube on the same side, there is no distinct normal lumen but there is a greatly increased amount of fibromuscular tissue. In the cornu are many gland-like spaces lined by tubal epithelium and some of these are surrounded by definite endometrial stroma (Fig. 3). Near by are other areas of definite endometrium showing both stroma and glands. In the isthmus and ampulla the epithelium is all tubal in type, but there is an abundance of typical endometrial stroma surrounding the gland-like spaces (Figs. 4, 5, and 6).

The other cornu and isthmus show no adenomatous formation, but the ampulla on this side shows an old salpingitis with much scarring. The ovaries appear normal

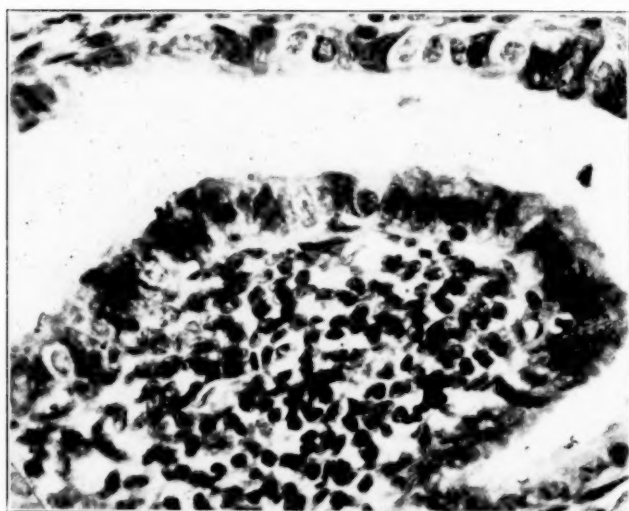


Fig. 3.

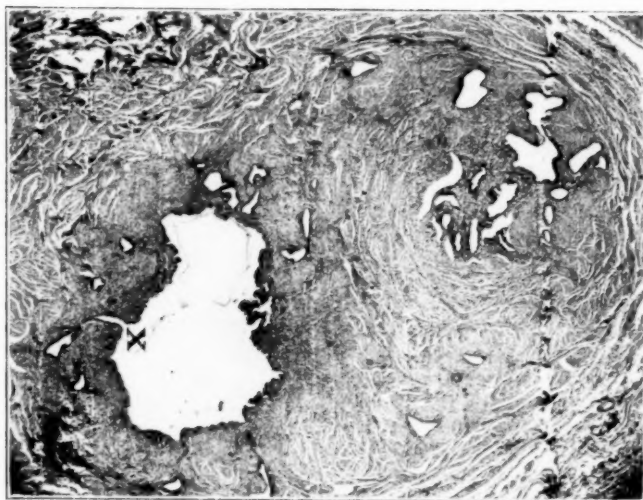


Fig. 4.



Fig. 5.

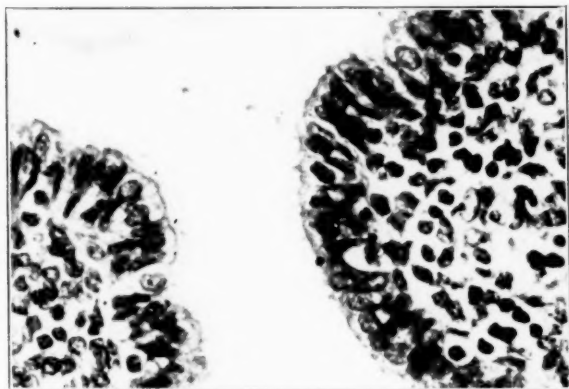


Fig. 6.

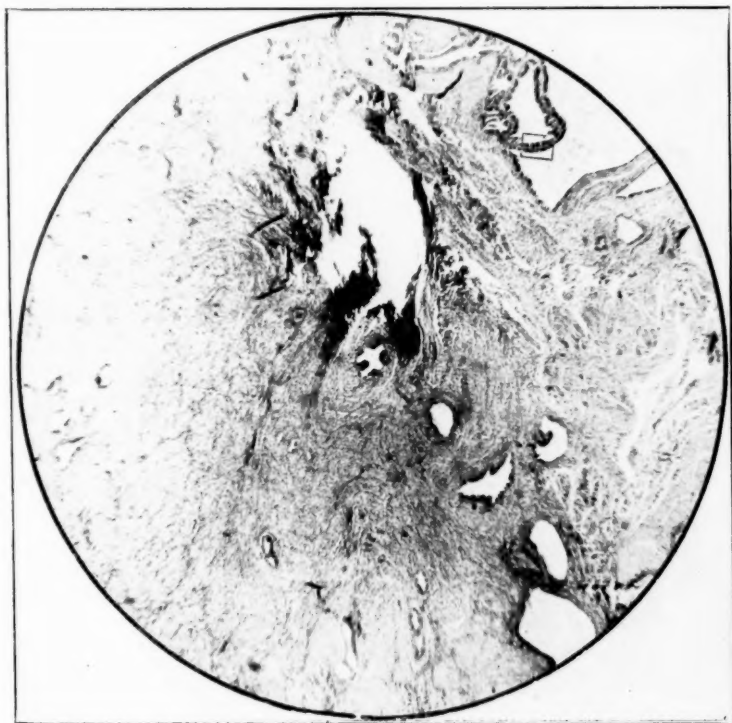


Fig. 7.

Fig. 3.—Gyn. Path. No. 32914. Photomicrograph ($\times 660$) of another gland-like space. This is also lined by tubal epithelium but is surrounded by a little stroma of endometrial type.

Fig. 4.—Gyn. Path. No. 32914. Photomicrograph ($\times 20$) of a cross-section of the tubal isthmus from the same case and same side as Fig. 3. No normal tubal lumen can be seen in this section but there is a marked adenomyomatous process.

Fig. 5.—Gyn. Path. No. 32914. Photomicrograph ($\times 60$) showing higher magnification of area shown at *x* in Fig. 4. This shows that there is a real endometrium-like tissue with stroma, surface epithelium and glands lining the spaces shown in Fig. 4.

Fig. 6.—Gyn. Path. No. 32914. Photomicrograph ($\times 660$) of region marked by *x* in Fig. 5, showing that while the stroma is really endometrial in type, the epithelium is tubal.

Fig. 7.—Gyn. Path. No. 33029. Photomicrograph ($\times 40$) showing an adenomyomatous formation in the uterine cornu from another specimen not the subject of previous operation. The area included in the square is indicated by *x* in Fig. 8.



Fig. 8.—Gyn. Path. No. 33029. Photomicrograph ($\times 60$) of an area of adenomyoma from the section shown in Fig. 7. Even at this magnification the two types of cells characteristic of tubal epithelium can be distinguished.

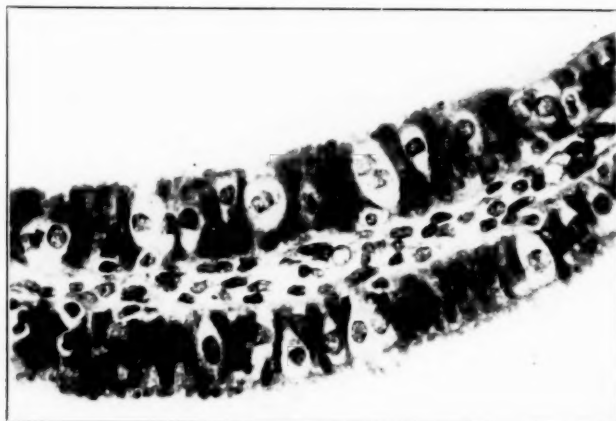


Fig. 9.—Gyn. Path. No. 33029. Photomicrograph ($\times 660$) of the area marked by *x* in Fig. 8. The two types of cells characteristic of tubal epithelium are shown very strikingly.

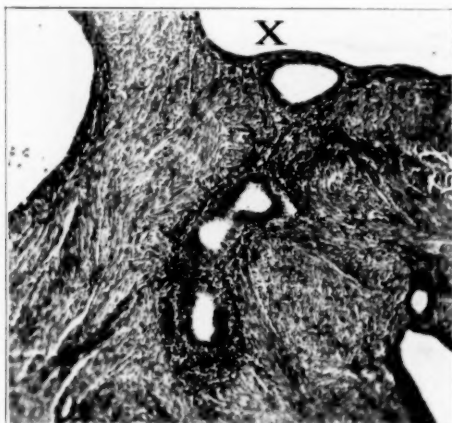


Fig. 10.—Gyn. Path. No. 33029. Photomicrograph ($\times 60$) of another area from the same section as Figs. 8 and 9. This shows real endometrium with stroma and glands.

except for the fact that in them near the periphery are several gland-like spaces lined by tubal epithelium.

CASE 25.—No. 33029. M. E. T., aged fifty-three, colored. L.M.P., seventeen months previous to operation.

Operation.—Feb. 2, 1928, supravaginal hysteromyomectomy; bilateral salpingo-oophorectomy; appendectomy.



Fig. 11.—Gyn. Path. No. 33029. Photomicrograph ($\times 660$) of area marked by *x* in Fig. 10. This shows that the epithelium in this area is also endometrial in type.

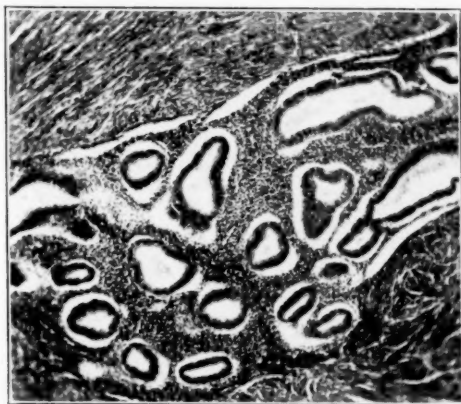


Fig. 12.—Gyn. Path. No. 33141. Photomicrograph ($\times 60$) of real endometrial adenomyoma of the uterine cornu from a specimen not the subject of previous operation.

Pathologic Diagnosis.—Myomas of the uterus, submucous, interstitial, subserous; senile endometrium; adenomyoma of uterine cornua; tubes normal; ovaries senile; appendicitis, chronic.

Description.—Both uterine cornua show in the myometrium numerous gland-like spaces (Fig. 7), for the most part lined by tubal epithelium with the usual two types of cells (Figs. 8 and 9). The lining of a few of the spaces, however, is composed of a uniformly nonciliated type of columnar cell more suggestive of endometrial gland epithelium, and around these is a thin layer of endometrial stroma (Figs. 10 and 11). Deep in one section is a rather large island of endometrium.

CASE 28.—No. 33141. V. R., aged forty-one, colored. L.M.P., doubtful.

Operation.—March 6, 1928; supravaginal hysteromyomectomy; bilateral salpingo-oöphorectomy.

Pathologic Diagnosis.—Myomas of the uterus, submucous, interstitial, subserous; adenomyoma of uterine cornu; interval endometrium; follicular hydrosalpinx, bilateral; atresia of ovaries.

Description.—Both uterine cornua show a large amount of adenomyoma consisting of definite endometrium with both stroma and glands (Fig. 12). There are in addition, however, a few gland-like spaces lined by epithelium which is tubal in type, and without any suggestion of endometrial stroma surrounding them.

In addition to the 37 cases listed above as showing a glandular picture in the uterine cornu or tubal isthmus, 10 cases were found during the course of this study in which the endosalpinx, which normally lines the isthmic and interstitial portions of the tube, was replaced either wholly or in part by endometrium. In four of these cases the sections were from the isthmus, while in the other six they were from



Fig. 13.—Gyn. Path. No. 31127. Photomicrograph ($\times 20$) of lumen of tubal isthmus containing an endometrial polyp. The wall of the isthmus opposite the polyp is lined by tubal epithelium.

the region of the cornual-isthmic junction. In two of the cases there was projecting into one side of the tubal lumen a small endometrial polyp with normal endosalpinx lining the rest of the lumen (Fig. 13). In the other eight cases the endosalpinx was entirely replaced by endometrium (Figs. 14 and 15).

This, it seems to me, furnishes additional evidence that in the uterine cornu and tubal isthmus we are dealing with a region which is variable in its histologic structures. This is the region of transition between the development of the müllerian ducts into tubal tissues on the one hand and uterine tissues on the other. The exact point of this transition is by no means constant, as is shown by these last ten cases. It does not seem surprising, therefore, to find aberrant rests of either tubal mucosa or endometrium, or, as we have seen, both simultaneously at various points in this region. Furthermore, considering the common origin

of these two types of tissue no great stretch of the imagination is required to picture a metaplasia of one of them into the other. It seems to me that some of the cases described above furnish rather convincing evidence that this does actually occur.

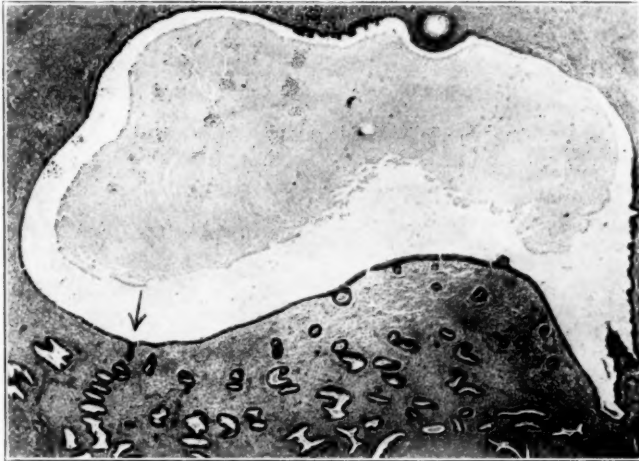


Fig. 14.—Gyn. Path. No. 33268. Photomicrograph ($\times 20$) of tubal isthmus lined by endometrium.

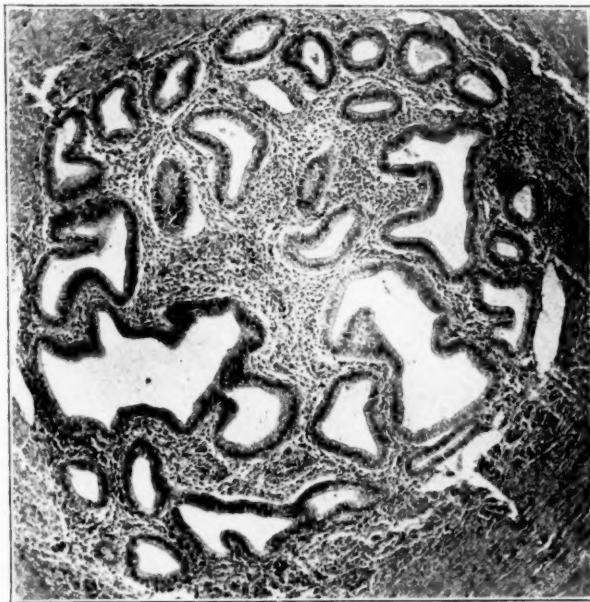


Fig. 15.—Gyn. Path. No. 33361. Photomicrograph ($\times 150$) of interstitial portion of tube lined by endometrium.

It is beyond the scope of this paper to go thoroughly into the origin of these glandular formations in the uterine cornu and tubal isthmus. This subject has been much discussed in the literature and two op-

posite theories have been advanced; one that we have here a true adenomyomatous process, and the other that it results from an inflammatory process in the tube, so-called "salpingitis isthmica nodosa." It is possible that both theories are correct, the one applying to some cases, while the other may be used to explain others. My material certainly tends to show that all of the cases cannot be explained upon an inflammatory basis. As evidence of this it will be seen from Table I that in 8 of the 37 cases presenting a glandular picture in the cornu the tubes were perfectly normal, while in several others there were only the vestiges of a previous, very mild, inflammatory reaction, with practically no distortion of the endosalpinx. On the other hand, of the 85 cases without glandular formation in the cornu, 60 showed some form of salpingitis. It seems evident, therefore, that an inflammatory process is neither essential to the formation of these patterns, nor does it necessarily result in their formation. One must conclude therefore that at least in a certain number of cases they are truly neoplastic adenomyomas.

II. EVIDENCE FOR A TUBAL ORIGIN OF ENDOMETRIOSIS FROM THE LITERATURE

If one studies the literature on the subject carefully, paying particular attention to the descriptions and illustrations of individual cases, there is to be found abundant evidence for a tubal origin of a great many cases reported as endometriosis. In many instances, especially in the cases reported by Sampson, this possibility has been mentioned casually from time to time, but never strongly emphasized.

A very striking example occurs in a report of two cases of "Adenomas of Endometrial Origin in Laparotomy Scars Following Incision of the Pregnant Uterus," by N. Sproat Heaney of Chicago.¹² In this article Fig. 3 shows a high-power picture of a gland in the abdominal scar, and it is quite evident from the presence of two types of cells, ciliated and nonciliated, that the epithelium of this gland is tubal in type. The first operation on this patient had been three years before the second, when a round ligament suspension of the uterus with resection of the uterine ends of the tubes had been done. A six to seven weeks' fetus had also been removed through a fundal incision at the same time, but from the character of the epithelium in the abdominal scar it seems evident that this had arisen from an implant from the tubal resection rather than from the incision of the uterus.

Sampson, in his article on "The Life History of Ovarian Hematomas, etc.," as has been mentioned, suggests the possibility that some of them may be derived from tubal epithelium; and in 5 of the 20 cases described in detail, it is specifically stated that part of the epithelial cells are ciliated (Cases 3, 7, 8, 9, and 11). In two other cases (12 and 13) the description is such as to suggest a tubal rather than an endometrial origin. Similarly, in the article on "Intestinal Adenomas of Endometrial Type,"¹³ the illustrations and descriptions of individual

cases reveal the presence of ciliated cells in several of them, and the possibility of origin of the so-called endometrial implants from either tubal mucosa or endometrium is again mentioned.

In his more recent article on "Endometriosis Following Salpingectomy,"¹⁰ Sampson emphasizes the probability of endometriosis arising from tubal epithelium transplanted by the surgeon in the course of a previous salpingectomy. In summary he makes the following statement: "Post-salpingectomy endometriosis usually arises from sprouts growing out from the traumatized mucosa of the tubal stump. These sprouts may invade not only the wall of the tube but also the uterine cornu and any structure adjacent or adherent to the stump, such as the tissues of the broad ligament, the ovaries (3 cases), and even the abdominal wall (2 cases)."



Fig. 16.—Gyn. Path No. 29745. Photomicrograph (X20) showing a portion of a follicular hydrosalpinx included in the substance of the ovary as a result of adhesions. It is conceivable that such an inclusion might, by proliferation, result in an endometriosis of tubal type, or by metaplasia in one of endometrial type.

"The misplaced tubal mucosa in these lesions, at times retains its original structure and at other times *assumes both the structure and function of the uterine mucosa* including its reaction to menstruation and pregnancy If tubal epithelium transplanted during salpingectomy grows, it should also grow if transplanted during other operations than salpingectomy and by other means than operations."

It is this last suggestion thrown out by Sampson that I wish to emphasize as being borne out by the material here presented.

III. INCIDENCE OF TUBAL EPITHELIUM AMONG CASES DIAGNOSED AS ENDOMETRIOSIS

In a careful microscopic analysis of 24 recent consecutive cases diagnosed as endometriosis in our laboratory I have found that in 6 of

them the process was definitely of tubal origin, or at least that the epithelial lining of the cysts was definitely tubal in type. In 8 cases there was definite endometrium only, while in 3 cases both endometrial and tubal types of epithelium were present. In the 7 other cases the epithelium was so distorted by compression from hemorrhage into the cysts or by a superimposed inflammatory process that it was impossible definitely to distinguish its type. There follows a more detailed description of some of the more interesting and important cases in this series.

CASE 2.—No. 29745. M. W., aged thirty-seven, colored.

Operation.—Supravaginal hysteromyomectomy; right salpingo-oöphorectomy; left salpingectomy; appendectomy.

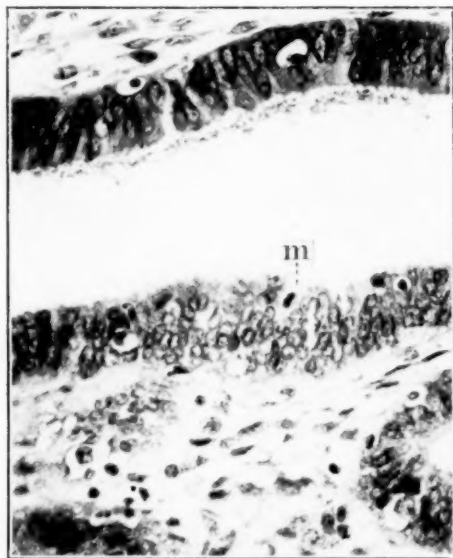


Fig. 17.—Gyn. Path. No. 31372. Photomicrograph ($\times 660$) of a small endometrial cyst of the ovary lined by real endometrial epithelium. Note the mitotic figure at *m*. These rarely occur in tubal epithelium.

Pathologic Diagnosis.—Myomas of the uterus, interstitial and subserous; salpingitis, chronic, follicular, bilateral; endometriomas of the right ovary; appendix normal.

Description.—The sections of the ovary show several cysts without epithelial lining and with a surrounding zone of fresh hemorrhage. They may be either endometrial cysts in which the lining epithelium has been destroyed by hemorrhage, or what is more likely they may be small corpus luteum hematomas. There is, however, embedded in the substance of the ovary a definite fragment of a follicular hydrosalpinx (Fig. 16). It is conceivable that the endosalpinx herein contained might by metaplasia become endometrium thus giving rise to endometriosis of the ovary.

CASE 3.—No. 31372. V. C., aged thirty, white.

Operation.—Left salpingo-oöphorectomy; appendectomy.

Pathologic Diagnosis.—Endometrial cysts of ovary; tube normal; appendix normal.

Description.—The ovary contains several follicular retention cysts and in addition there is a slit-like crevice lined by a single layer of deeply staining columnar epithelium quite similar to that seen in endometrial glands in the early interval stage. This is surrounded by a loose stroma in which are a few glands lined by the same type of epithelium (Fig. 17). There are even a few mitoses which are practically never seen in tubal epithelium. In the same section, however, about 1 cm. away, is a single gland-like space lined by tubal epithelium with the characteristic two types of cells (Fig. 18).

CASE 4.—No. 31386. L. F., aged thirty-two, white.

Operation.—Panhysterectomy; bilateral salpingo-oophorectomy.

Pathologic Diagnosis.—Uterus normal; salpingitis, chronic, left; endocervicitis, chronic; endometrial cysts of ovary, left.

Description.—The left tube and ovary are closely adherent and the sections taken show several cross-sections of the tubal lumen. In the substance of the ovary, however, is a cystic space surrounded by stroma markedly like that of endometrium, and containing glands. The epithelium lining both the main cavity of the cysts and



Fig. 18.—Gyn. Path. No. 31372. Photomicrograph ($\times 660$) of a similar cyst from the same ovary but lined by tubal epithelium. Note the large phagocytic cells in the stroma containing blood pigment.

the glands is tubal in type with the characteristic ciliated and nonciliated cells (Fig. 19). In places there is considerable hemorrhage into the stroma. At another point some little distance away is another small area of typical endometrial stroma with a few glands the lining epithelium of which is also typically endometrial in type, even showing mitoses (Fig. 20).

This strikes me as a case in which the process has originated probably as an inclusion of tubal epithelium in the substance of the ovary, perhaps as a result of the inflammatory process which has evidently gone on in the past. At the time of removal, however, considerable metaplasia has taken place, until with the acquisition of stroma and glands, there are many of the features of real endometrium (in the last small area described, all of them). The epithelium, however, in the larger area still maintains its tubal characteristics, thus giving us a lead as to the primary origin of the process.

CASE 5.—No. 31502. M. F., aged twenty-nine, white.

Operation.—Right salpingo-oophorectomy; excision of cyst of left ovary; modified Coffey suspension of uterus; appendectomy.

Pathologic Diagnosis.—Endometrial cyst of right ovary; corpus luteum cyst of left ovary; tube normal; appendix normal.

Description.—The cyst of the right ovary, which grossly is about 4 cm. in diameter and filled with dark brown blood, is seen microscopically to be lined by a single layer of epithelium which for the most part is so flattened and distorted by compression that little can be made out as to the nature of the cells. In a few



Fig. 19.—Gyn. Path. No. 31386. Photomicrograph ($\times 660$) of an area of ovarian endometriosis showing uterine stroma but tubal epithelium.

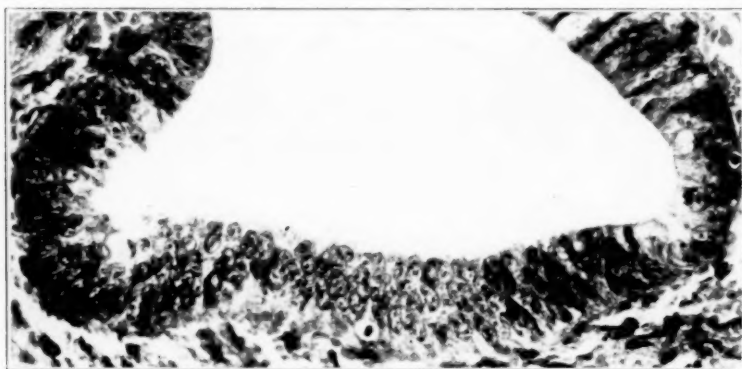


Fig. 20.—Gyn. Path. No. 31386. Photomicrograph ($\times 660$) of another area of endometriosis from the same ovary as Fig. 19 but showing the endometrial type of epithelium. Again note the mitoses.

small areas where the cells are better preserved they resemble more closely those of tubal than those of uterine mucosa. Beneath the the epithelium is a layer of loose stroma resembling endometrial stroma which is quite vascular and contains considerable blood pigment. On the surface of the ovary in one area are several papilla-like projections covered by tubal epithelium (Fig. 21).

CASE 6.—No. 31597. F. P., aged forty-seven, white.

Operation.—Supravaginal hysterectomy; bilateral salpingo-oophorectomy; appendectomy.

Pathologic Diagnosis.—Tuboovarian abscess, left; ovarian abscess and chocolate cyst, right; periappendicitis, chronic.

Description.—The abscess occupies most of the right ovary, but situated in the ovarian stroma, outside of the inflammatory membrane lining the abscess cavity, are several gland-like spaces lined by tubal epithelium. There is also one small cyst filled with old blood and lined by columnar epithelium similar to that found in the tube. Of more significance than the picture seen in the ovary, however, is

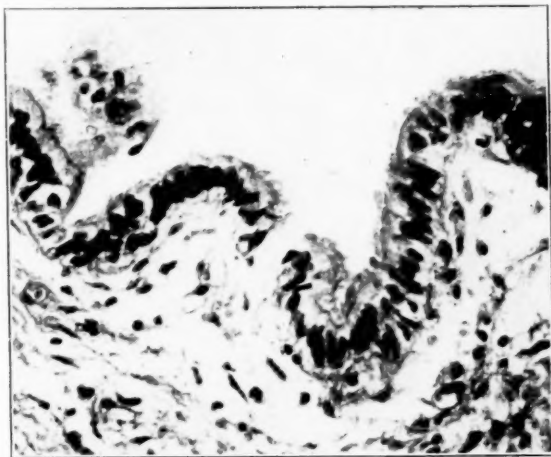


Fig. 21.—Gyn. Path. No. 31502. Photomicrograph ($\times 660$) of a bit of tubal epithelium attached to the surface of an ovary.

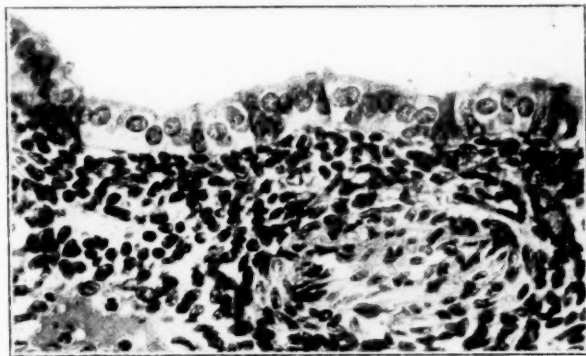


Fig. 22.—Gyn. Path. No. 31597.—Photomicrograph ($\times 660$) of a portion of a gland from an area of adenomyoma of the uterus. The stroma is uterine but the epithelium is tubal in type.

a small area of adenomyoma found alone in the uterine wall near the peritoneal surface. This shows typical endometrial stroma and a few glands lined by epithelium of the endometrial type. A greater number of glands, however, are lined by epithelium which is characteristically tubal (Fig. 22).

CASE 7.—No. 31630. R. B., aged twenty-six, colored.

Operation.—Salpingo-oophorectomy, left; salpingectomy, right; appendectomy.

Pathologic Diagnosis.—Endometrial cyst of left ovary; salpingitis, chronic, bilateral; appendix normal.

Description.—The left ovary contains in its substance a small cyst lined by well-preserved endometrium in the interval phase. There are also a few tubules lined by tubal epithelium, but as there is a definite chronic salpingitis with the tube closely adherent to the ovary, and as these tubules are all situated near the adherent tube, they are probably of little significance.

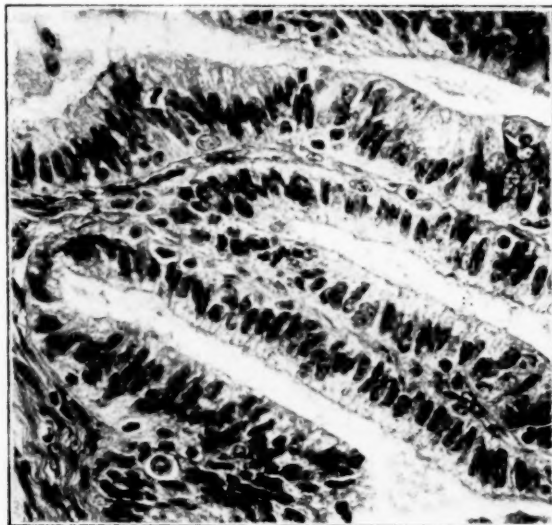


Fig. 23.—Gyn. Path. No. 31856. Photomicrograph (×660) of a portion of a small hemorrhagic cyst of the ovary. The gross configuration suggests somewhat the folds of the endosalpinx and the epithelium resembles a little more closely that ordinarily found in the tube than it does that of endometrium.

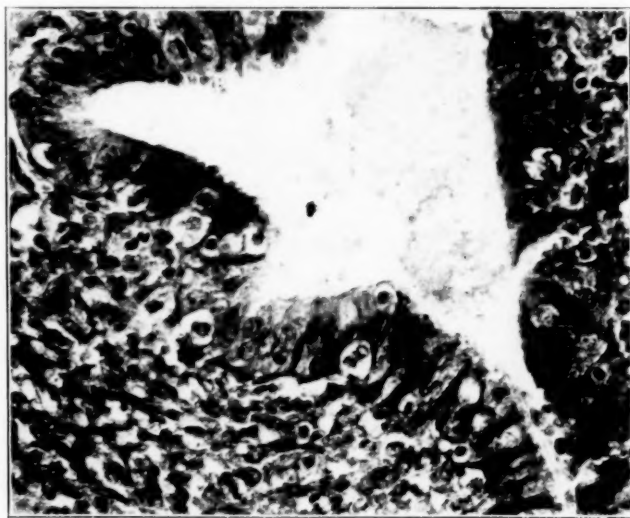


Fig. 24.—Gyn. Path. No. 31856. Photomicrograph (×660) of a part of the wall of a hemorrhagic cyst in the other ovary from the same case as Fig. 23. In the epithelium are seen the two types of cells characteristic of tubal epithelium.

CASE 9.—No. 31839. Mrs. F., aged thirty-four, white.

Operation.—Supravaginal hysterectomy; bilateral salpingo-oophorectomy; appendectomy; cholecystectomy.

Pathologic Diagnosis.—Endometrial cysts of left ovary; pelvic endometriosis; tubes and appendix normal.

Description.—On the surface of the ovaries are many adhesions with old hemorrhage, and an occasional bit of epithelium, which, however, is so distorted that it is impossible to classify it as tubal or endometrial. In the left ovary is a cystic cavity filled with old blood and lined by epithelium which in places is so distorted by compression that it is impossible to recognize its type. In other areas, however, it is better preserved and resembles more closely tubal epithelium than it does that of endometrium. There is no stroma, but the surrounding ovarian tissue contains many phagocytic cells containing much blood pigment.

CASE 10.—No. 31856. N. M., aged forty-two, white.

Operation.—Supravaginal hysteromyomectomy; bilateral salpingo-oöphorectomy; appendectomy.

Pathologic Diagnosis.—Myoma uteri, mural; normal endometrium; normal tubes; endometrial cysts of the ovaries; peritoneal endometriosis; appendix normal.

Description.—The epithelium in the peritoneal implants cannot be definitely classified. In one ovary is a cyst 5 or 6 cm. in diameter, with a wall consisting of lamellated layers of connective tissue in which there are many large phagocytic cells

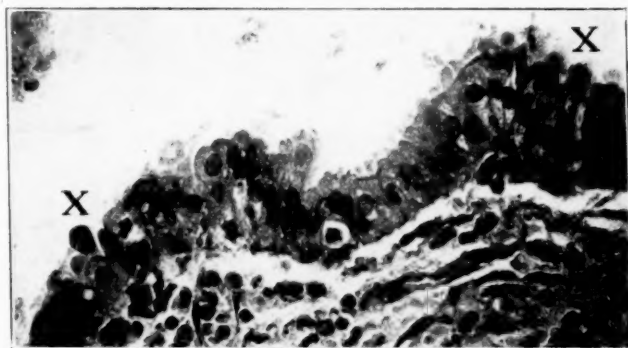


Fig. 25.—Gyn. Path. No. 31930. Photomicrograph ($\times 660$) of a portion of the wall of a small hemorrhagic cyst of the ovary. The epithelium is typically tubal in type, and at *x* may be seen the extrusion phenomenon of the nonciliated cells described by Novak and the author.

containing blood pigment. The epithelium lining this cyst is for the most part composed of a single layer of columnar cells which are not easily classified as tubal or endometrial in type, though they resemble a little more closely the former. In two areas there is a bit of stroma containing glands, and at still another point a smaller cystic cavity with epithelial lined papillary projections into it, somewhat resembling the cross-section of an endosalpinx. This epithelium, however, is also difficult to classify (Fig. 23). In the other ovary is a smaller cyst with well-preserved epithelial lining in which the character of the cells is definitely tubal (Fig. 24).

CASE 11.—No. 31930. M. B., aged forty-one, white.

Operation.—Bilateral oöphorectomy.

Pathologic Diagnosis.—Endometrial cysts of both ovaries; follicular and corpus luteum cysts of right ovary.

Description.—Both ovaries contain epithelial lined cysts filled with old blood. Beneath the epithelium is a thin layer of stroma with phagocytic cells and blood pigment, but there are no glands. The epithelium of both is composed of the two types of cells characteristic of tubal epithelium, and in one the secretory or non-ciliated cells show the extrusion phenomenon described by Novak and myself¹¹ (Fig. 25).

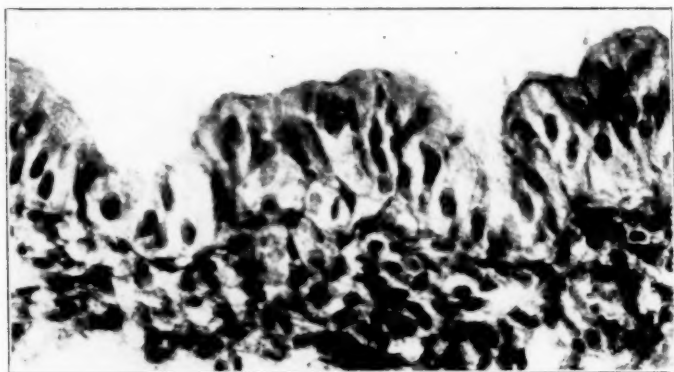


Fig. 26.—Gyn. Path. No. 32236. Photomicrograph ($\times 660$) showing tubal epithelium lining an endometrial cyst of the ovary.

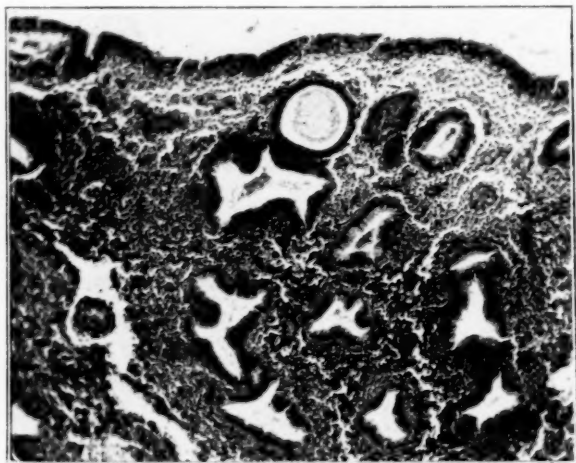


Fig. 27.—Gyn. Path. No. 32236. Photomicrograph ($\times 150$) of another area from the wall of the same cyst as is shown in Fig. 26. This shows typical endometrium in the interval stage.



Fig. 28.—Gyn. Path. No. 32236. Photomicrograph ($\times 150$) showing still another area of the wall of the cyst as shown in Figs. 26 and 27. This also resembles true endometrium, but the epithelium lining the glands is tubal in type.

CASE 12.—No. 32236. S. F., aged forty-eight, white.

Operation.—Supravaginal hysteromyomectomy; bilateral salpingo-oöphorectomy; appendectomy.

Pathologic Diagnosis.—Myomas of the uterus, mural and submucous; endometrial cysts of the ovaries, bilateral; salpingitis, chronic, bilateral; appendix normal.

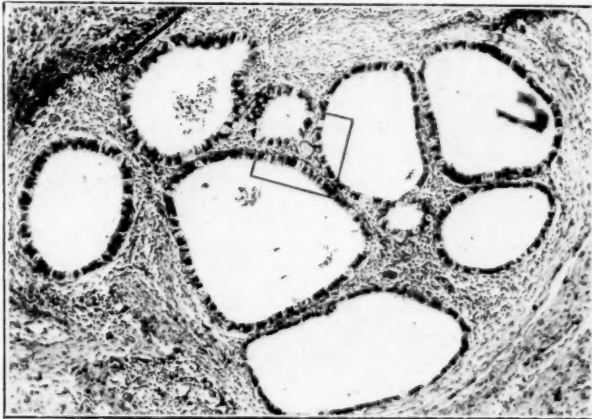


Fig. 29.—Gyn. Path. No. 32278. Photomicrograph ($\times 62$) of an adenomyoma of the umbilicus. Even at this magnification the epithelium can be recognized as tubal in type.

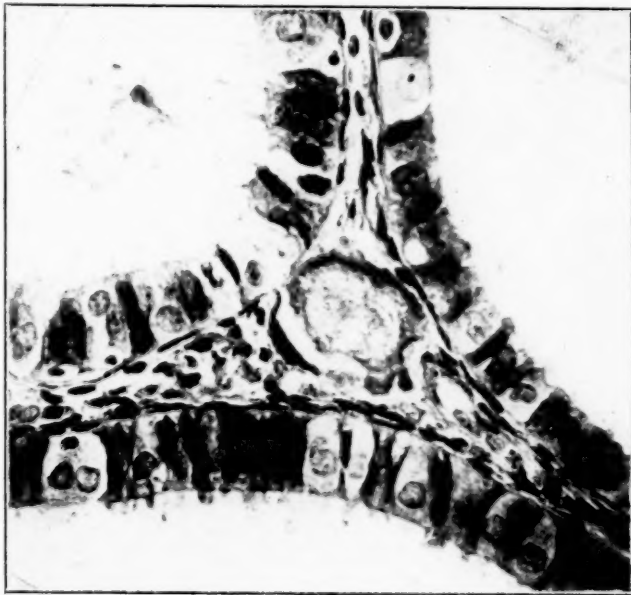


Fig. 30.—Gyn. Path. No. 32278. Photomicrograph ($\times 660$) of a small area from Fig. 29. This is a striking illustration of the characteristic features of tubal epithelium.

Description.—The endometrial cyst of one ovary is most striking in the variety of its cellular structure. It is lined for the most part by a single layer of columnar epithelium which is typically tubal in type (Fig. 26). This epithelium overlies a thin layer of loose stroma in which there are pigment-laden phagocytes. In several areas the stroma is thicker and contains definite glands. In one of these areas the

glands are typical of endometrium in the interval stage (Fig. 27), while in another area near by the glands present the same configuration but are lined by tubal epithelium (Fig. 28). It seems to me that in this one cyst we have possibly represented various stages in a metaplasia of tubal epithelium into endometrium. Fig. 26 represents the beginning, simple tubal epithelium with the addition of a small amount of endometrial stroma. Fig. 28 presents an intermediate stage where the stroma has been penetrated by glands, but the glands are still lined by tubal epithelium. In Fig. 27 we have the final stage, true endometrium.

CASE 13.—No. 32278. E. B., aged thirty-two, colored.

Operation.—Supravaginal hysteromyomectomy; left salpingo-oöphorectomy; partial resection of right ovary; resection of left round ligament; appendectomy; umbilectomy.

Pathologic Diagnosis.—Myomas of the uterus, subserous; endometriosis of ovaries, left round ligament, pelvic peritoneum and umbilicus.

Description.—Evidence of endometriosis can be found in all the regions mentioned, in the form of an abundance of scar tissue with considerable extravasation

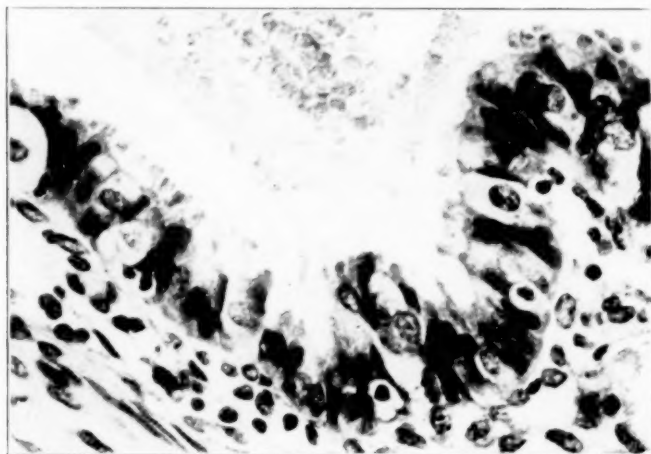


Fig. 31.—Gyn. Path. No. 33016. Photomicrograph (X660) of a portion of the wall of a small hemorrhagic cyst of the ovary. The epithelium is typically tubal, but there is a thin layer of stroma suggestive of endometrium.

of old blood, and phagocytic cells containing blood pigment. In the ovaries are several small cysts and tubules lined by typical tubal epithelium. There is also evidence of old hemorrhage into the substance of the ovaries and numerous small areas of calcification are present usually near the tubules and cysts. Similar tubules lined by tubal epithelium are found here and there beneath the peritoneum covering the myoma.

The section of the umbilicus is most striking. In it can be seen a group of gland like spaces with a small amount of intervening stroma resembling closely that of normal endometrium. Around this group of glands is a considerable amount of fibromuscular tissue, so that the structure is that of an adenomyoma of the umbilicus. The epithelium lining the glands, however, is a beautiful example of tubal epithelium showing very strikingly the ciliated and nonciliated cells (Figs. 29 and 30). In his book on *The Umbilicus and Its Diseases*,¹⁴ Cullen has fully discussed such tumors, describing one case from his own observations and collecting several others from the literature.

CASE 17.—Gyn. Path. No. 33016. C. C., aged twenty-six, white.

Operation.—Myomectomy; right oöphorectomy; resection of cyst of left ovary.

Pathologic Diagnosis.—Adenomyoma uteri; endometrial and follicular cysts of right ovary; corpus luteum cyst of left ovary.

Description.—Almost in the center of the right ovary is a small cyst, about 1.5 cm. in diameter, filled with old blood, and lined by a single layer of columnar epithelium which is well preserved and typically tubal in type. Beneath this is a thin layer of tissue resembling endometrial stroma and containing considerable extravasated old blood (Fig. 31).



Fig. 32.—Gyn. Path. No. 33016. Photomicrograph (×660) from a section showing adenomyoma of the uterus from the same case as in Fig. 31. The glands and stroma here are typically endometrial.



Fig. 33.—Gyn. Path. No. 33016. Photomicrograph (×660) of another area of adenomyoma of the uterus from the same section as Fig. 32. The stroma here is uterine in type but the epithelium is tubal.

In the portion of the uterus removed there are numerous extensive islands of adenomyoma. These for the most part are composed of true endometrium with a hyperplasia pattern showing dense stroma and glands, varying greatly in size and lined by typical uterine epithelium with even an occasional mitotic figure (Fig. 32). In a few smaller islands, however, though there is still an abundance of endometrial stroma, the epithelium lining the glands is tubal in type (Fig. 33).

CASE 18.—Gyn. Path. No. 33026. N. B. H., aged forty, white.

Operation.—Supravaginal hysterectomy; right salpingo-oophorectomy.

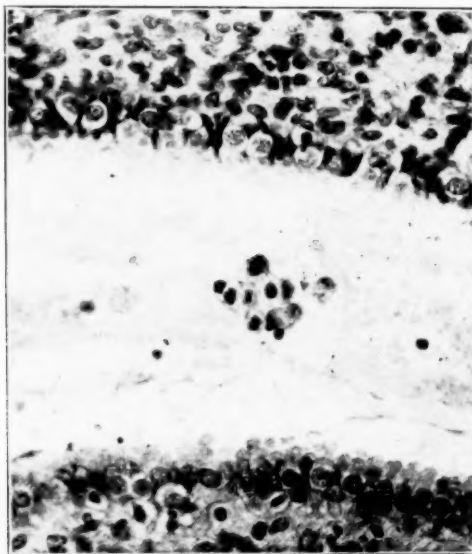


Fig. 34.—Gyn. Path. No. 33026. Photomicrograph ($\times 660$) through the wall of a small hemorrhagic cyst of the ovary, showing endometrial stroma and tubal epithelium.

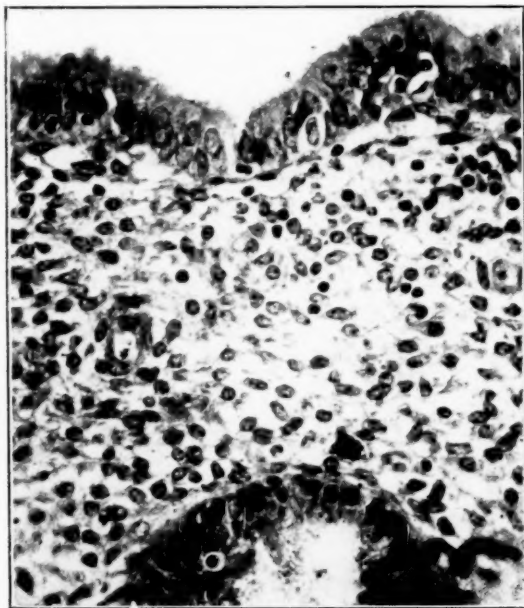


Fig. 35.—Gyn. Path. No. 33026. Photomicrograph ($\times 660$) of a portion of the wall of another hemorrhagic cyst from the same ovary as in Fig. 34. The tissues here, both epithelium and stroma, are typically uterine.

Pathologic Diagnosis.—Adenomyoma uteri; endometrial polyp; premenstrual endometrium; follicular, simple serous, and endometrial cysts of right ovary; pelvic endometriosis; normal right tube.

Description.—There is no diffuse adenomyoma of the uterus but there are several islands of endometrial tissue embedded deep in the myometrium at widely separated spots. One of these is near the base of an endometrial polyp and several others occur just beneath areas of adhesions on the posterior peritoneal surface. All of these areas show typical endometrium with normal glands and stroma.

One of these areas is located in the right uterine wall posteriorly just beneath a point where the right ovary is adherent to the uterus. This adherent portion of the ovary contains several hemorrhagic cysts varying in size from a few millimeters to two centimeters in diameter and exhibiting various stages in development. One of the smaller ones, while surrounded by an endometrial type of stroma, is lined by typical tubal epithelium (Fig. 34). Another larger cyst is lined by typical well-preserved endometrium, with stroma, surface epithelium and glands all uterine in type (Fig. 35). In a still larger cyst the epithelial lining has been destroyed, presumably by compression from the contained blood.

CASE 20.—Gyn. Path. No. 33422. J. K., aged forty-two, white.

Operation.—Bilateral salpingo-oophorectomy.

Pathologic Diagnosis.—Endometrial cysts, follicular cysts, and corpus luteum hematomas of the ovaries; tubes normal.

Description.—Both ovaries contain hemorrhagic cysts lined by definite endometrium with typical stroma and glands. The surface epithelium, however, in places shows two types of cells, ciliated and nonciliated, suggestive of tubal epithelium.

SUMMARY

It has been pointed out that an adenomatous formation composed of either tubal epithelium or endometrium, or in a few cases of both simultaneously, occurs rather frequently in the region of the uterine cornu and tubal isthmus. A previous operative trauma of this region is not essential for the production of such an adenomatous formation, nor is it necessarily associated with any previous inflammatory process. It may be considered then as a truly neoplastic formation or primary adenomyoma.

From the types of epithelium described in these adenomyomas it is evident that they may arise from tubal epithelium as well as endometrium. The presence in a few cases of spaces lined by tubal epithelium as well as islands of true endometrium in the same specimen suggests the possibility of a metaplasia of one of these types of mucosa into the other. The finding of gland-like spaces lined by tubal epithelium but surrounded by endometrial stroma is even more suggestive of this possibility. The finding of ten cases in which the interstitial or isthmie portion of the tube is lined by endometrium rather than tubal mucosa is further evidence of the histologic variability of this region, and suggests again the possibility of a metaplasia of one of these types of mucosa into the other.

Evidence gathered from the literature, particularly from the work of Sampson, tends to show that a number of cases reported as endometriosis are really cases of aberrant tubal epithelium. It is noted, however, that Sampson has called attention to this fact from time to

time, and in a more recent work on "Endometriosis Following Salpingectomy" has stressed the probability of a metaplasia of tubal mucosa into endometrium.

In a review of 24 cases diagnosed as endometriosis in our own laboratory it has been found that in a third of them the epithelial elements were definitely tubal in type. In some of them there was in addition to the tubal epithelium an endometrial-like stroma. In a few instances cysts lined by tubal epithelium and others with real endometrium occurred in the same case. In one very striking case the same hemorrhagic cyst of an ovary was lined in part by tubal epithelium, while another area of the cyst wall showed real endometrium with stroma and glands. Such cases lend additional evidence to the hypothesis that tubal epithelium may, by metaplasia, be transformed into endometrium.

CONCLUSIONS

From the evidence presented above we may derive the following conclusions:

1. An operative trauma is not necessary for the production of an adenomatous process in the uterine cornu or tubal isthmus.
2. Such adenomatous processes do not necessarily result from an inflammatory process.
3. The tissues involved in such an adenomatous process may be either tubal mucosa or endometrium, or both in one and the same case.
4. There is evidence to suggest that in some cases in which endometrium is present it may arise from tubal epithelium by metaplasia.
5. Many cases diagnosed as endometriosis are really collections of cystic spaces lined by tubal epithelium.
6. In some cases of ovarian and pelvic endometriosis real endometrium and spaces lined by tubal epithelium occur simultaneously, again suggesting the possibility of metaplasia.

Finally, I wish to thank Dr. Thomas S. Cullen for permission to undertake this study and for his helpful criticisms and suggestions, and Dr. Gerald B. Hurd for his painstaking assistance in preparing the photomicrographs.

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A CLINICOPATHOLOGIC STUDY OF ECLAMPSIA BASED UPON THIRTY-EIGHT AUTOPSIED CASES

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IN THE paper "Status of Eclampsia in the Philippines" Acosta-Sison and Baens discussed in detail the clinical picture of the disease together with its incidence, prognosis, and mortality as observed among Filipinos. In the present study, an effort was made to develop the correlation of the symptomatology with the pathologic findings and so only the autopsied cases were chosen for our material. As 15 patients, or 38.4 per cent of our cases presented besides liver involvement also varying degrees of chronic nephritis which however was not marked, the clinical data were separated into two groups according to whether the pathologic findings revealed chronic nephritis or not.

None of the patients had prenatal care and 33 of them were admitted unconscious and with history of one or more convulsions at home; four had convulsions a few hours after admission, and one arrived in an apparently good condition except for some bleeding caused by marginal previa.

There was no outstanding difference in the clinical manifestation of both groups. The mode of onset was almost the same. All the cases with one exception in each group had edema of a greater or lesser extent either in the lower extremities alone or also in the face from a few days to over a week before the onset of convulsions. Seven cases, one of them belonging to the chronic nephritic group, had anasarca before the convulsions. Headache in those who had convulsions was a constant complaint occurring either a few hours to a few days before the first attack. This emphasizes the importance of headache as a sign of imminent convulsion.

The uranalysis on admission showed a marked trace of albumin, many casts and erythrocytes in 66.66 per cent in Group I and in 85 per cent in Group II. The rest of the cases had moderate albumin and a few casts.

The blood pressure was high, from 140 to 270 systolic in 22 cases and from 120 to 135 systolic in 6; one case had only 107 systolic. The diastolic pressure oscillated from 80 to 180 in 29 cases.

The temperature ranged from 38° C. to 41° C. in 25, or 64 per cent of the cases; whereas in twelve the temperature was merely from 37° C. to 37.5° C., the pulse was rapid, from 100 to 160 in 30, or 76.9 per cent, and from 84 to 92 in 8 cases. In one case, it was only 82.

TABLE I. CLINICAL PICTURE OF ECLAMPSIA GROUPED ACCORDING TO THE PRESENCE OR ABSENCE OF CHRONIC NEPHRITIC LESION AT AUTOPSY

	ECLAMPSIA WITHOUT CHRONIC NEPHRITIS 23 CASES	ECLAMPSIA SUPERIMPOSED ON CHRONIC NEPHRITIS 15 CASES	TOTAL 38 CASES
1. VARIETIES:			
Antepartum	12	7	19
Intrapartum	10	6	16
Postpartum	1	2	3
2. CONDITION OF PATIENT WHEN FIRST SEEN:			
In semiconscious or comatose condition with one or more convulsions at home	19	13	32
Conscious but had convulsions within a few hours after admission to the hospital	4	1	5
Conscious but died soon after an agonal rigidity (45')	1		1
3. EDEMA OF THE LOWER EXTREMITIES ALONE OR ALSO OF THE FACE:	21 (Of these, 6 had anasarca)	14 (Of these, 1 had anasarca)	35 (Anasarca 7)
No edema	2	1	3
4. URANALYSIS:			
a) Heavy albumin, many casts and red cells	66.66%	85%	
b) Moderate albumin and casts	33.33%	15%	
5. BLOOD PRESSURE:	Cases	Cases	Cases
Systolic	150-220 — 13 125-130 — 3 107 — 1	140-270 — 9 120-130 — 3	140-270 — 22 120-155 — 6
Diastolic	102-175 — 13 80-100 — 3 75 — 1	30-180 — 12	75-180 — 29
6. TEMPERATURE ON ADMISSION:			
38° C. to 41° C.	17	8	25
37° C. to 37.5° C.	7	6	13
7. PULSE RATE ON ADMISSION TO THE HOSPITAL:			
100 to 140	18	11	29
160	1	0	1
8. RESPIRATORY RATE:			
28 to 40	17	13	30
20 to 26	7	2	9
9. AGE OF PREGNANCY:			
5 months	1	0	1
6 months	0	1	1
7 months	1	1	2
8 months	2	4	6
9 months	18	7	25
Not stated	1	2	3
10. PARITY:			
Primipara	19	8	27
Multipara	4	6	10
Relative proportion of primipara and multipara	4¾ primipara to 1 multipara	11¼ primipara to 1 multipara	2.7 primipara to 1 multipara

TABLE I—CONT'D

		ECLAMPSIA WITHOUT CHRONIC NEPHRITIS 23 CASES	ECLAMPSIA SUPERIMPOSED ON CHRONIC NEPHRITIS 15 CASES	TOTAL 38 CASES		
11. TREATMENT AND MANNER OF DELIVERY:						
Conservative, undelivered		11	8	19		
Conservative and low forceps		3		3		
Conservative and midforceps		4	1	5		
Conservative and spontaneous delivery		1	1	2		
Conservative podalic version			1	1		
Cesarean		3	2	5		
Postpartum eclampsia after spontaneous delivery		1	2	3		
12. LENGTH OF LIFE SINCE THE TIME OF FIRST CONVULSION:						
	NO. OF CASES	NO. OF HRS.	AV. NO. OF HRS.	NO. OF CASES	NO. OF HRS.	AV. NO. OF HRS.
Undelivered	11	2 to 48	10	8	4 to 36	14½
Low forceps	3	5 to 16½	10			
Midforceps	4	4 to 16½	11½	1	19	
Spontaneous delivery	1	30		2	18 hr. to 12 dy.	
Podalic version				1	24	
Cesarean section	3	30 to 96	45	2	24 hr. to 12 dy.	
Postpartum eclampsia	1	5½		1	10 days	

The respiration was accelerated in all the cases; from 20 to 26 in 9, or 23 per cent, and from 28 to 40 in 30, or 76.9 per cent of the cases.

While a temperature of 39.5° C., a pulse rate of 120, and a respiratory rate of over 30 may be regarded as indicators of a serious prognosis (Acosta-Sison and Baens), death may supervene before a high rise of temperature and marked acceleration of pulse and respiration occur at least three hours before death. In one of the women who died without convulsions, the temperature, pulse, and respiratory rate was only 37-82-20. Apparently in those patients with little or no rise of temperature, the seriousness of the prognosis depends on the lack of proportion between the low temperature and the accelerated pulse or respiration.

Studying carefully the data in the two groups in Table I, one notices the greater incidence of earlier onset of eclamptic symptoms among those with chronic nephritis than among those who were without, the proportion of prematurity being 40 per cent in the former against 16.66 per cent in the latter.

The outstanding difference between the two groups is the marked relative incidence of eclampsia in primiparae among those who showed no chronic nephritic lesion at autopsy, four and three-fourths times as often as among multiparae in the same group; whereas in those patients who presented chronic nephritis at autopsy, the incidence among primiparae was only one and one-third as often as in multiparae.

Table I also demonstrates the high proportion in both groups of un-

delivered patients treated conservatively on account of undilated cervix, amounting to 51.2 per cent of the total. This does not necessarily argue against the conservative treatment, for it is probable that had these cases been cesareanized they would have been also lost, it rather indicates a severe toxic condition that overwhelmed the patients beyond recovery before or in the early stage of labor. In the survey on eclampsia among Filipinos referred to, the advantage of the conservative over the radical treatment, performed under general anesthesia, had been shown. The authors believe, nevertheless, that cesarean section should be performed in very severe cases where the fetuses are still alive, for the sake of the latter.

In the 36 cases that had convulsions, death occurred from two to forty-eight hours after the initial convulsion. One patient lived for ten days, and another for twelve days. Both of these had chronic nephritic lesions. The patients that lived the shortest time after the first convulsion were those who died undelivered. As a general rule those that presented chronic nephritic lesions lived longer after the initial convulsion than those who were otherwise free. It seems paradoxical that patients who had chronic nephritis could live longer. Perhaps, with such a lesion, the maternal organism acquires a certain degree of resistance, so to speak, which allows a slower death although it predisposes the patient to the eclamptic attack before the full term is

TABLE II. LIVER IN ECLAMPSIA, 38 AUTOPSIES

	NO. CASES	PERCENTAGE
Larger than normal	8	21.0
Softer than normal and friable	10	29.4
Pale	8	21.0
Pale yellowish	13	34.0
Grayish white	2	5.26
Disturbances in the circulation	21	55.0
Congestion	7	17.9
Hemorrhages	24	63.0
Discrete from: 1 mm. to 2 cm. in diameter	20	51.0
Petechial	4	10.0
Location of hemorrhage, throughout but especially under the capsule	10	29.4
Throughout but especially in the right lobe	2	5.26
No hemorrhages	7	18.4
Alteration in the parenchyma:		
Cloudy swelling	2	5.26
Fatty degeneration throughout liver substance	5	13.1
Fatty degeneration around central vein	1	2.6
Fatty degeneration especially around portal areas	3	7.8
Focal necrosis scattered indistinctly in liver substance	26	68.40
Focal necrosis especially in portal and central areas, extensive	1	2.6
Focal necrosis especially around the central vein	1	2.6

over. The eclampsia cases without chronic affection of the kidneys would seem to be overwhelmed with the poison and either die quickly or their previously healthy organs return quickly to their normal condition, when properly treated in the early stage.

From the Tables II to X it can be seen that the liver and kidneys are the organs most constantly affected. The heart, lungs, and brain are also affected but in a smaller number of cases.

Liver.—The main changes found in the liver were disturbances in its circulation ranging from congestion (7 cases), petechial hemorrhages (4

TABLE III. KIDNEYS IN ECLAMPSIA, 38 AUTOPSIES

Acute parenchymatous degeneration		13
Marked	1	
Slight but accompanied by marked liver changes	3	
Hemorrhagic necrosis		2
Acute glomerulo nephritis		1
Subacute nephritis		6
Anemia and cloudy swelling		1
Chronic nephritis		15
Chronic parenchymatous	5	
Chronic interstitial	9	
Chronic interstitial, only slight	1	
Chronic interstitial, subacute nephritis	2	
Chronic interstitial, acute glomerulo nephritis	1	
Pyelonephritis	1	

TABLE IV. HEART IN ECLAMPSIA, 38 AUTOPSIES

	NO. OF CASES
Normal	13
Pale and soft	6
Congestion	2
Subendothelial petechial hemorrhages	1
Slight hypertrophy	1
Hypertrophy, right	2
Hypertrophy, left ventricle and epicardial petechial hemorrhage	1
Dilatation, especially right	1
Fatty degeneration and hypertrophy	4
Fatty degeneration and petechial hemorrhages	1
Acute endocardial degeneration	4
Chronic vegetative rheumatic endocarditis	1
Chronic myocarditis and valvulitis	1

cases), to large discrete hemorrhagic patches (21 cases) varying in size from a few millimeters to 2 cm. in diameter. In 7 cases no hemorrhages were found. The parenchyma varied from mere cloudy swelling (32 cases), fatty degeneration (7 cases), and focal necrosis (28 cases). It should be noted that Pelliet,² Schmorl,³ Williams,⁴ Opie⁵ and Fahr⁶ regard peripheral necrosis of the lobule as the characteristic liver lesion in eclampsia. The necrosis is said to be produced by pressure from the extravasated blood that has escaped through the portal capillaries. Efforts were made to find these supposedly pathognomonic lesions of eclampsia. We found the portal areas especially affected

TABLE V. LUNGS IN ECLAMPSIA, 38 AUTOPSIES

	NO. OF CASES	
Normal		7
Congestion		10
Hypostatic	3	
With pleural adhesions	2	
Edema		6
Not marked and localized	5	
Marked	1	
Edema and congestion		8
Marked	6	
Parenchymatous degeneration		1
Petechial hemorrhages		1
Bronchopneumonia hypostatic		2
Localized pulmonary tuberculosis		2
Anthraxis		1

TABLE VI. BRAIN IN ECLAMPSIA, 16 AUTOPSIES

	NO. OF CASES	PERCENTAGE
Not examined	23	
Examined	16	
Normal	7	45
Congestion	6	(of examined cases)
Edema	2	
Meningeal hemorrhage	1	

TABLE VII. SPLEEN IN ECLAMPSIA, 38 AUTOPSIES

	NO. OF CASES
Normal	18
Congestion	8
Petechial hemorrhages	4
Small and soft	4
Slightly enlarged	3
Splenomegaly (1207 grams)	1

in three cases of fatty degeneration, and in one case of focal necrosis. In one case the central area alone was affected, in another the portal area, most markedly, and the central areas were the sites of necrosis. In the rest of the cases the focal necroses were indistinctly scattered in the liver lobule without predilection for any particular zone. Our findings therefore fail to confirm the prevalent view that focal necrosis around the portal areas is a frequent if not the constant lesion found in eclampsia. They agree more to the view of Bell,⁷ Levy-Solal⁸ and Tzanck⁹ in that the hemorrhagic, fatty and degenerative changes in the liver do not always choose the portal areas but may affect any part of the lobule. In some cases the necrosis was found more around the central vein, and in others, in the midzonal areas. However there is a distinct predisposition of the subcapsular regions and the right lobe to be affected more than the rest of the liver. This was also noticed by Dieckmann⁹ who attributes it to the fact that the blood current in the portal circulation from the stomach, duodenum and jejunum goes to the right lobe, an observation made by Copher and Dick.¹⁰

TABLE VIII. PANCREAS IN ECLAMPSIA, 38 AUTOPSIES

	NO. OF CASES
Normal	21
Pale	2
Congested	4
Edema	1

TABLE IX. ADRENALS IN ECLAMPSIA, 38 AUTOPSIES

	NO. OF CASES
Normal	28
Congested	4
Pale	2
With increased pigmentation	3
With punctate hemorrhages	1

TABLE X. URINARY BLADDER IN ECLAMPSIA, 38 AUTOPSIES

	NO. OF CASES
Normal	23
Congestion	3
Punctate hemorrhages	1
Edema	1

Kidneys.—The changes found were for the most part degenerative in character in the region of the convoluted tubules. While in six cases there were marked kidney lesions in the form of acute glomerulonephritis, pyelonephritis and extensive parenchymatous degeneration, in the remaining number the kidney lesions were not so marked as to justify death. It is interesting to note that in fifteen or 36.4 per cent of the cases, chronic nephritis was the lesion found and in only three of these was the chronic affection attended by an acute or subacute process. In two cases the lesion found was only a slight chronic interstitial nephritis. All the cases with chronic nephritis were attended by the characteristic hemorrhagic focal necrosis of the liver, and in one of them, the hemorrhagic patches throughout the liver measured 1 to 2 cm. long and 0.51 cm. wide. I have diagnosed these cases presenting chronic lesions in the kidneys as eclampsia superimposed on chronic nephritis, a classification already given by Williams.

The large percentage (38.46) of attendant chronic nephritis, exhibiting at the same time liver lesions common in eclampsia and with death from "clinical" eclampsia, coupled with the observation that cases of marked nephritis had not shown eclamptic symptoms and either terminated in slow recovery or in death, where at autopsy the kidneys were found to be greatly damaged while the liver was not altered, forces us to the conclusion that eclampsia is an acute affection, not directly arising from faulty kidneys, but independently of them, which when it attacks a patient with some kidney affection, aggravates the prognosis.

Heart.—Apparently the heart is not as frequently affected as even the lungs, for it was normal in thirteen, or 33.33 per cent of the cases.

It was pale and soft in six cases and congested in two. The lesions found in the rest of the cases varied from fatty degeneration to myocardial degeneration (5 cases each). In three cases petechial hemorrhages were also found. In another three cases there was hypertrophy and in still another, dilatation. The main findings were fatty or degenerative changes and a tendency to petechial hemorrhages.

Lungs.—The lungs were apparently normal in 8, or 21 per cent of the patients. Slight congestion was found in 10 patients, edema in 6, congestion and edema in 7, petechial hemorrhages in 1 patient and parenchymatous degeneration in another patient. Bronchopneumonia was also found in 2 and localized pulmonary tuberculosis in 2 patients. From the above it can be seen that there is no characteristic lung lesion to speak of in eclampsia. Doubtless however the congestion and edema play an important rôle in the mortality when present.

Brain.—The brain was examined in only 16 cases, and it was found to be normal in seven patients, or 45 per cent. There was congestion in 6 patients, edema in two, and meningeal hemorrhage in 1 patient.

Changes in Other Organs.—The spleen, pancreas, adrenals and urinary bladder were normal respectively in 50, 55, 74, and 60 per cent of the cases. The only changes found in those affected were slight pallor, slight edema or slight congestion. Punctate hemorrhages were found in the adrenals in one patient, and in the urinary bladder in another patient.

The above findings show that the main organs affected in eclampsia are the liver, kidneys, heart, lungs, and brain with a great predominance of the liver and the kidneys, and the striking changes found in the majority of cases are, especially in the liver capillary hemorrhages and focal degeneration of the parenchyma cells.

It is generally conceded that the liver is the organ mainly affected in eclampsia but there is a divided opinion as to whether the hepatic lesion is "post hoc" or "propter hoc." Stander¹² believes that it develops early in the disease. Dieckmann⁹ claims that a sudden production of a marked liver lesion might precipitate the attack of eclampsia. Titus¹³ says it is not quite clear whether the liver involvement precedes or results from the toxemia.

Is the liver injury which necessarily impairs the liver function the primary cause of eclamptic symptoms or is there a common cause for both the symptoms and the organic lesions?

Perhaps the following observations may throw some light on this mooted question.

Among these 38 cases studied, in 34 or 89.4 per cent, it was found that there was parallelism between the severity of the symptoms and the autopsy findings. In two patients, however, who had severe clinical eclampsia with frequent convulsions rapidly followed by deep coma, high fever and rapid pulse, it was a great surprise to find at

autopsy only slight cloudy swelling of the liver and kidneys. There were no hemorrhagic spots in any organ. In one there was bilateral pulmonary edema, and in another slight pulmonary edema in the middle lobe and slight congestion in the lateral lobes. Both were primipara and both had the disease at the ninth month of pregnancy. One died undelivered and the other, a mother of twins, succumbed fifteen hours after cesarean section was performed without anesthesia. We believe that in this case life was prolonged a few hours after the abdominal delivery. No doubt the pulmonary edema in both cases contributed to the fatal end. But why the severe symptoms with no more liver or kidney lesion than a slight cloudy swelling? These two cases would seem to indicate that the eclamptic symptoms are not caused by the hemorrhagic liver lesions and that death may occur even without much liver or kidney injury. This must be correlated with the well-known fact that recovery in eclampsia is rapid and complete. It may be, though impossible to prove, that the cases that recover do not have much liver injury as is frequently seen at autopsy.

While I do not wish for the present to delve into the much discussed etiology of eclampsia, still it may be pertinent to note that death from eclampsia may occur without demonstrable pathologic lesions in the liver, kidneys, heart, or brain to justify the severity of the symptoms, and the rapid and complete recovery of an eclamptic case when it does not end fatally, in contradistinction with the slow uncertain relative recovery of a nephritic patient. This may have some bearing on the etiology of the disease. It seems to point out that the liver lesions and other acute organic lesions and the convulsions in eclampsia are primarily the result of a common origin, presumably a toxin or an altered blood condition and that provided the cause be removed or be rendered inactive in the early stages, recovery follows. On the other hand, the continuation of the anomalous state in the circulation produces not only the eclamptic symptoms but also the organic lesions notably found in the liver and kidneys.

While the two above-cited cases of severe clinical eclampsia presented only slight cloudy swelling of the liver and kidneys, one case presented the reverse of the picture. This patient died during the pregnancy with no symptoms of convulsion or unconsciousness except stiffness and cyanosis a few seconds before death. There was no edema but the patient was well nourished and entered the hospital in labor on account of intermittent bleeding due to placenta previa. On admission, the temperature was 37° C., pulse 82, and respiration 20. The blood pressure was 107 systolic. There was no history of visual disturbances nor of headache. After rupturing the membranes, $\frac{1}{4}$ c.c. of pituitrin was injected. Five minutes afterward, she became rigid and cyanosed with frothing at the mouth. The pulse became then filiform, the respiration irregular, and death rapidly supervened. At the autopsy there were found extensive hemorrhagic necrosis of the liver and marked parenchymatous degeneration of the visceral organs. There were many petechial hemorrhages in the endocardium. The pathologic diagnosis was eclampsia.

If the rapid death in this case is to be attributed to the hemorrhagic necrosis of the liver which must have taken place quickly, is it not also equally possible that the causative agent, whether it is a specific toxin or a toxic blood condition due to faulty metabolism, was produced at such an excessive amount that it paralyzed the bulbar center at the same time that it worked havoc in the organs, principally the liver?

Apparently, the *modus operandi* of what we shall call here as eclampsia toxin for want of a better term is first stimulation and irritation of the bulbar center of the nervous system producing all the nervous phenomena of eclampsia such as high blood pressure, headache, convulsions, etc. The bulbar center may be so sensitive that a certain amount of toxin may be strong enough to paralyze it without causing organic lesions in the heart, liver and kidneys at least. For the majority of cases however, the organic lesions take place when symptoms become severe. An excessive amount of toxin may quickly paralyze the bulbar center and may at the same time cause extensive organic lesions in the different organs, especially the liver. In this way clinically unrecognized cases of eclampsia or rather the convulsionless form succumb to a rapid death.

SUMMARY

1. Of 38 autopsies made of patients dying from eclampsia, 38.4 per cent exhibited chronic nephritic lesion besides focal hemorrhagic necrosis of the liver.
2. Eclampsia superimposed on a chronic nephritis has a more serious prognosis than an uncomplicated eclampsia.
3. There is a high incidence of primiparity in eclampsia ($4\frac{3}{4}$ to 1 multipara) among women without chronic nephritis but this incidence becomes relatively lower ($1\frac{1}{2}$ primipara to 1 multipara) among women suffering from chronic nephritis.
4. Focal areas of hemorrhagic necrosis and fatty degeneration predominately in the periphery of the liver lobule were observed only in a few cases, the liver lesions were rather scattered indistinctly in the lobule with special susceptibility of the central areas.
5. The correlation of the fact that eclampsia ending in recovery usually does so rapidly and completely within the limit of puerperium in contradistinction with the slow and relative recovery of nephritic toxemia, where the kidneys are definitely known to be organically involved, and the observation that severe clinical eclampsia may occur without alteration of the liver and kidneys except only cloudy swelling, seem to prove that a liver lesion, even to the extent of hemorrhagic necrosis or fatty degeneration is not the cause but rather the result of eclampsia.
6. Rapid death from a convulsion-free form of eclampsia coming on

suddenly is possible and is perhaps due to a sudden overwhelming toxemia which at the same time may produce severe organic lesions.

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1002 TAFT AVENUE.

Candela, Nicolo: Accumulation of Blood, Reflexed from the Uterus, Into the Peritoneum. A Contribution to the Etiology of Endometrioma. Ann. di ostet. 51: 1501, 1929.

The author describes a case of hemoperitoneum due to blood passing through the tubes from the uterus, because of a submucous fibroma, and enumerates the various causes which might lead to an accumulation of blood in the peritoneal cavity. He tries to show that the theory of Sampson on the genesis of endometrioma, cannot be considered audacious and far-fetched, but rather is easily comprehensible in view of the relative ease and frequency of passage of blood from the uterus into the abdominal cavity.

SYDNEY S. SCHOCHET.

JULIUS E. LACKNER.

Holland, Wilbur W.: Primary Carcinoma of the Fallopian Tubes. Surg. Gynec. Obst. 51: 683, 1930.

In this review of 386 recorded cases, report of 9 new cases and study of 10,000 removed tubes, the author shows that there is noticeable a gradual increase in the occurrence of primary carcinoma of the fallopian tubes. Inflammatory changes in tubes do not deserve the etiologic significance attributed to them by many writers. The proper diagnosis of carcinoma of the tubes can be arrived at only by macroscopic and microscopic examination. Papillary alveolar and alveolar types represent advanced stages of primary papillary malignancy.

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THE INCIDENCE, DIAGNOSIS AND TREATMENT OF FUNCTIONAL STERILITY*

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IT MAY be said without contradiction that the study of sterility in the female requires a more thorough understanding of the physiology and pathology of the generative and associated organs than any other gynecologic condition. This pertains, especially, to the study of functional sterility.

It is equally true that from a remunerative standpoint, the time-consuming and painstaking search for the underlying cause and its successful treatment is sadly disappointing. Few of these patients are able or willing to pay for the tremendous amount of clinical and laboratory studies necessary in the diagnosis of these cases, especially when the hope for an ultimate cure with the limited means at our disposal is so uncertain. For this reason, few gynecologists have given this problem, which is of great social importance, their serious thought. Most hospitals are busily engaged in the relief of the physical afflictions of mankind and are unprepared to render the necessary service to the numerous women who suffer from the mental agony of infertility.

Involuntary sterility is on the increase in all civilized countries. Its incidence in this country is placed at 13 per cent by Reynolds and Macomber.¹ Lotka² places the gross sterility of the American white population at 17 per cent. A condition so prevalent certainly deserves our serious attention. The relief of sterility due to organic conditions of the generative tract is largely a matter of sex hygiene and eugenics, but functional sterility in the female is beyond the scope of prophylaxis; it is largely a product of civilization.

In a previous study of 506 cases of female sterility,³ we found that endocrine malfunction was the responsible factor in 25 per cent. Our present study is limited to a group of 103 sterile women in whom patency of the fallopian tubes was established by means of the Rubin test; other organic conditions of the generative tract, except hypoplasia, were eliminated. Fertility of their mates was established by means of the Hühner test alone or combined with an examination of the condom specimen. In 22 of these women, we found persistently dead spermatozoa in the cervical secretions and vaginal pool several

*Read before a Meeting of the Obstetrical Society of Philadelphia, November 6, 1930.

hours after coitus, though the condom specimens showed numerous actively motile spermatozoa. This finding, in the absence of cervical infection, argues for the existence of a biologic incompatibility between the cervical secretions and the spermatozoa of their respective mates. What rôle endocrine deficiency plays in the production of such incompatibility is still a matter for investigation.

In order to understand the factors involved in the etiology of functional sterility, we must review briefly the physiology of the female generative organs in the light of recent developments in the study of sex endocrinology. Hitschmann and Adler⁴ were the first to observe the cyclic endometrial changes occurring in the human female. The dependence of the rhythmic endometrial changes upon simultaneous evolutionary phenomena in the ovary was first noted by Schröder.⁵ These observations were not clearly understood until the comparatively recent work of Frank,⁶ and Allen⁷ on the hormone of the graafian follicle; Weichert,⁸ Hisaw,⁹ and Corner¹⁰ on the lutein hormone of the corpus luteum; and Zondek and Aschheim,¹¹ and Smith¹² on the sex hormone of the anterior pituitary gland.

The result of their extensive experimental studies which were confirmed by others, too numerous to mention, may be summarized as follows:

The sex hormone (or hormones) of the anterior pituitary gland is the motor of ovarian function. Hypophysectomy causes degeneration of the animal ovaries and abolition of all sex functions. Anterior pituitary transplants into the hypophysectomized animal results in complete restitution of ovarian function (Smith¹³). Reactivation of sex function in senile and sexually unfit animals by means of anterior pituitary transplants was observed by Zondek and Aschheim.¹⁴ We obtained the same effects by treating senile animals with the blood serum or urine of pregnant women. Senile female white mice were kept under observation in the laboratory for two months, during which time they showed no evidence of estrus. A unilateral oophorectomy was then performed on a number of these animals and 10 c.c. of blood serum or urine of pregnant women, in divided doses, were injected into each of the animals in the course of two days. At the end of four days, most of them became estrous and showed phenomenal reactivation of the remaining ovary as compared with the control. Serial sections of the ovaries showed maturation of graafian follicles and formation of corpora lutea. Animals which were not killed at the end of four days were repeatedly brought into estrus by means of these injections.

The blood and urine of pregnant women contain large quantities of female sex and anterior pituitary hormones. The former has no influence on the ovaries, though it can bring a senile or an infantile animal into a state of estrus. The ovaries, however, of the animals thus

treated remain unaffected. The pituitary hormone, on the other hand, exerts its influence solely upon the ovaries; the female sex hormone elaborated by the maturing graafian follicles, as a result of this influence, produces changes in the lower genital tract characterized as estrus.

Infantile animals can be brought into a state of sexual maturity by means of anterior pituitary implants and potent extracts thereof (Zondek¹⁵). The maturing graafian follicle elaborates female sex hormone which produces growth and vascularization of the uterus and cornification of the vaginal epithelium, as evidenced by the vaginal smear. At this phase of the sexual cycle, the endometrium of the animal is still of an interval type. Through the continued stimulation by the anterior pituitary hormone the graafian follicles are transformed into corpora lutea. The latter produce in addition to female sex hormone an even more important principle, namely, lutein hormone which prepares the endometrium for nidation and inhibits further development of graafian follicles (Papanicolaou,¹⁶ and Corner and Allen¹⁰). In other words, the uterus is brought into a pregravid state, preparatory to the reception of the fertilized ovum, through the influence of the corpus luteum hormone. Without a progestational endometrium, imbedment of a fertilized ovum is impossible. Failure of fertilization results in regressive changes in the corpus luteum and consequent dismantling of the bridal bed which, through the medium of the lutein hormone, nature prepares in anticipation of a fertilized ovum. What causes the withdrawal of the hormonal influence of the anterior pituitary gland upon the corpus luteum when fertilization is not accomplished is, as yet, unknown.

At this juncture, it may not be amiss to say a word concerning the reported "antagonism of growth and sex hormones" of the anterior hypophysis (Evans and Simpson¹⁷). It was thought that the growth hormone from the anterior pituitary lobe has an inhibitory action on ovulation and estrus through the rapid luteinization of maturing follicles before ovulation could occur. It was later shown by Wiesner and Crew¹⁸ that the anterior pituitary growth extract of Evans and Simpson is composed of two distinct hormones: (a) a growth hormone capable of producing gigantism in the animal; (b) a luteinization hormone.

Zondek,¹⁵ and Wiesner and Crew¹⁸ maintain that the anterior pituitary gland produces two sex hormones: (a) a follicle maturing hormone; (b) a luteinization hormone. This, however, is still an unsettled matter. The fact is that repeated implantations of anterior pituitary lobe or injections of excessive amounts of blood or urine of pregnant women produce a state of hyperluteinization in the ovaries of the test animal. In the overtreated animals, the granulosa cells of the maturing graafian follicles are converted into lutein tissue

before ovulation and estrus occur, causing an arrest of the ovum in the hyperluteinized tissue. The lutein hormone elaborated by the luteinized follicles, in a sense, is antagonistic to female sex hormone produced by the graafian follicle. It inhibits further ovulation and estrus in the course of preparing the generative organs for the reception of a fertilized ovum. In the uterus, it produces a progestational endometrium; in the vagina, it produces mucification of the epithelium analogous to the condition found in the pregnant animal.

THE OCCURRENCE OF PSEUDOMENSTRUATION IN THE MONKEY

The study of the *Macacus rhesus*, which duplicates the cycle of the human female in time, periodicity and the occurrence of actual bleeding, has given us invaluable information concerning the physiology of the human generative organs. Corner¹⁹ has shown that some of these animals menstruate without previous ovulation or formation of corpora lutea. Moreover, he observed that such cyclic uterine bleeding is never associated with a premenstrual endometrium, the bleeding being a sort of diapedesis from an interval endometrium. Where a corpus luteum was found at the onset of menstruation, the presence of a premenstrual endometrium was invariably evident. He thus corroborated the findings of others that the corpus luteum hormone is essential in the preparation of a premenstrual endometrium and, what is more important, is his proof that menstruation is not necessarily the result of ovulation and corpus luteum formation. This anovular menstruation of the *Macacus rhesus* may be called pseudomenstruation.

Its occurrence in the human female was suggested by Schröder²⁰ but has not yet been proved. We have, however, considerable clinical evidence justifying our belief in its existence. Many of us observed in the course of abdominal operations on regularly menstruating women, who were either at the tail end of the menstrual cycle or actually menstruating, the total absence of a recent or old corpus luteum. Thus, a careful observer like Allen²¹ says: "In one or two cases the evidence clearly points to absence of ovulation in the last several cycles. This condition, menstruation without ovulation, so common in the monkey, must be recognized as occurring in women."

CLASSIFICATION OF STERILITY

Child's²² classification of female sterility is complete and comprehensive. Primary sterility denotes that a woman has never conceived. Secondary sterility includes those cases where the woman has borne one or more children and has become sterile thereafter. Relative sterility embraces those cases where conception has taken place but resulted in early death of the fetus or in the birth of a nonviable child.

Of the 103 cases herein reported, 77 were primary, 15 secondary, and 11 relative sterility. The term "functional sterility," herein employed, designates those women who have remained involuntarily sterile for a period of three or more years; who presented stigmas of endocrine malfunction and in whom no organic condition was found to account for the existing sterility. Those presenting metabolic faults of extrinsic origin or debility due to a constitutional condition were not included in this study. Etiologically, they were classified into primary pituitary, ovarian, and thyroid malfunction. Twenty-three of this group, though presenting unmistakable evidence of endocrine malfunction, could not be classified into one of the three groups because of lack of clinical and laboratory evidence indicative of the particular gland involved.

TABLE I. CLASSIFICATION AS TO THE TYPE OF STERILITY AND APPARENT CAUSE

	PRIMARY	SECONDARY	RELATIVE	TOTAL
Pituitary	51	7	3	61
Ovarian	8	3	4	15
Thyroid	3	1	0	4
Unclassified	15	4	4	23
	77	15	11	103

CLASSIFICATION OF STERILITY AS TO ETIOLOGY

Primary Ovarian Hypofunction.—The existence of primary ovarian hypofunction in the noncastrated female is denied by some dependable observers who maintain that ovarian failure is invariably secondary to anterior pituitary malfunction. Others, equally competent, draw a sharp line of demarcation between primary and secondary ovarian failure. No single finding in the differential diagnosis between the two conditions is of greater significance than the presence of a demonstrable quantity of anterior pituitary hormone in the circulating blood. It at once eliminates hypofunction of the anterior pituitary lobe as the causal agent since, as Fluhmann²⁵ has shown, normal fertile women and, naturally, those suffering from failure of the anterior pituitary lobe rarely, if ever, show a demonstrable quantity of the hormone except during pregnancy.

It was shown by Tandler and Grosz,²⁶ and others, that the anterior pituitary gland hypertrophies after castration. Fluhmann²⁵ found a demonstrable quantity of anterior pituitary sex hormone in the blood of castrated women and in those in whom the natural menopause is well established. We found a demonstrable quantity of the hormone in 8 of 15 women who were classified as cases of primary ovarian failure because of stigmas and laboratory findings characteristic of the condition. This finding, in our opinion, is pathognomonic of primary ovarian deficiency. These women are either of the old-maid type

(eunuchoid) or superlatively feminine. Hair distribution is either normal or scanty. They are either of average weight or thin, rarely stout. They are usually self-centered, emotional and critical of environmental conditions. Hypoplasia of the generative organs is almost invariably found in these women. Menstrual irregularity or amenorrhea is present in over 50 per cent. The female sex hormone level is naturally low.

Primary Pituitary Malfunction.—The inadequacy of a single observation to establish a diagnosis of malfunction of a given endocrine gland is apparent. The importance of eliminating as a causative factor nonendocrine conditions, such as systemic diseases, is also apparent. It is hardly necessary to reiterate that the anterior pituitary gland is the primary source of ovarian function and that alteration in its activity almost invariably reflects upon the structure and function of the ovaries.

In addition to genital hypoplasia and menstrual derangements, these women present unmistakable evidence of pituitary hypofunction. They are usually stout. The deposit of adipose tissue shows a rather characteristic distribution. They possess a male distribution of pubic hair and an excess of hair in other localities. They lack the eccentricity and nervous instability of the ovarian type. Their sugar tolerance is usually increased because of an associated hypofunction of the posterior pituitary lobe. This test is of great value in the diagnosis of anterior pituitary failure when properly performed and verified.

In skilled hands, the eye examination, in this class of women, is more informative than any other single observation. Contraction of the visual fields, yellow color of the discs and enlargement of the blind spots point to pituitary malfunction. The size and shape of the sella turcica, as shown by x-ray studies, is of little value in the diagnosis of pituitary malfunction unless there is actual erosion of the clinoids, which is seen only in pronounced cases of pituitary hyperplasia. The level of female sex hormone is low in these cases and is of no value in the differential diagnosis between this condition and primary ovarian failure. A demonstrable quantity of anterior pituitary sex hormone was not found in any of the 43 cases studied (see Table IV). This is in contrast to the finding of a demonstrable quantity of this hormone in 8 of 15 cases of primary ovarian hypofunction.

Thyroid Hypofunction.—Thyroid hypofunction as the responsible agent was observed in only 4 of 103 cases presented in this report. The diagnosis is relatively easy if one resorts to the basal metabolism test, routinely, in the study of functional sterility.

Types of Menstruation.—Sterile women who show evidence of genital hypoplasia and other stigmas of endocrine malfunction, though

menstruating regularly, must be included in the functional sterility class. Thirty-seven in this series presented no apparent derangements of menstruation. Thirty-four menstruated at intervals of three or more months; these we term amenorrheic. Twenty-seven have had intervals of less than three months, hence the term oligomenorrhea. Those who menstruate regularly but scantily are termed hypomenorrheic; of these we have 5 in this series.

TABLE II. CLASSIFICATION AS TO APPARENT ETIOLOGY AND TYPE OF MENSTRUATION

	NORMAL	AMENOR- RHEA	OLIGOMEN- ORRHEA	HYPOMEN- ORRHEA	TOTAL
Pituitary deficiency	17	25	16	3	61
Primary ovarian deficiency	5	5	5	0	15
Thyroid deficiency	1	0	3	0	4
Unclassified	14	4	3	2	23
Total	37	34	27	5	103

Functional Sterility in Regularly Menstruating Women.—Amenorrheic and irregularly menstruating sterile women are unquestionably of low fertility. The female sex hormone test is of no diagnostic value in this class of patients. They rarely show a normal level of female sex hormone in the blood at a time when 94 per cent of normal fertile women show a demonstrable quantity of the hormone.

Regularly menstruating sterile women present a problem in diagnosis. Failure to obtain a demonstrable quantity of female sex hormone from their blood a day or two before the expected onset of the flow is, in our experience, indicative of ovarian hypofunction, either primary or secondary to anterior pituitary failure. To render this test more reliable, we abstract 80 c.c. of venous blood for the simultaneous use of two animals to provide against inherent resistance of one of the two animals to the stimulating effect of the female sex hormone contained in the patient's blood. Employing a duplicate test for female sex hormone, we have obtained a positive reaction in 64 of 68 normal fertile women. In the group of 37 regularly menstruating sterile women, 22 showed no demonstrable quantity of female sex hormone; 8 exhibited a threshold quantity; and only 7 showed a normal level.

Fourteen of this group could not be classified as to the particular gland involved. It is fair to assume that some of these who showed a normal level of female sex hormone were erroneously classified as endocrine cases.

The Occurrence of Pseudomenstruation in the Human.—Of even greater diagnostic value in this group of cases is the failure to recover a premenstrual endometrium by means of the curette a day or two before the expected onset of the flow. As shown in Table III, only 17 of the 37 women subjected to curettage a day or two before the

onset of the expected flow showed a perfectly normal premenstrual endometrium. Four showed a premenstrual endometrium with local hyperplasia; 1 an atrophic endometrium, and 5 a hyperplastic endometrium; the remaining 10 showed an interval endometrium. The correlation between an improperly prepared endometrium and the lack of female sex hormone in the blood is well illustrated in Table III.

TABLE III. (GROUP 1). FUNCTIONAL STERILITY IN REGULARLY MENSTRUATING WOMEN. RELATIONSHIP BETWEEN THE CONDITION OF THE ENDOMETRIUM AND THE LEVEL OF FEMALE SEX HORMONE

	FEMALE SEX HORMONE LEVEL			TOTAL
	NORMAL	THRESHOLD	NEGATIVE	
Interval endometrium	0	1	9	10
Hyperplasia	1	1	3	5
Atrophic endometrium	0	0	1	1
Premenstrual endometrium with local hyperplasia	0	0	4	4
Premenstrual	6	6	5	17
Total	7	8	22	37

In this group only a few were tested for the presence of anterior pituitary hormone in the blood.

Clinically, these cases were classified as follows: pituitary 17; ovarian 5; thyroid 1; unclassified 14.

Of the 20 presenting some abnormality of the endometrium only 3 showed a demonstrable quantity of female sex hormone in the blood a day or two before the onset of menstruation.

In the light of Corner's findings in the monkey and the clinical observations cited above, there is reason to believe that 16 of the 37 women subjected to a premenstrual curettage were subject to anovular menstruation or pseudomenstruation. It was shown by Robertson²³ that cyclic uterine bleeding can be induced in the castrated monkey by the sudden withdrawal of female sex hormone injections. Such uterine bleeding is, however, never accompanied by shedding of a premenstrual endometrium unless the preparatory treatment with female sex hormone is followed by injections of lutein hormone (Corner and Allen¹⁰). These observations on the *Macacus rhesus* help us to explain the absence of a premenstrual endometrium and the low level of female sex hormone in some of this group of women.

It is to be remembered that the corpus luteum continues the production of female sex hormone initiated by the maturing graafian follicle; simultaneously, it produces lutein hormone which is essential in the preparation of the premenstrual endometrium. It is the failure of ovulation and of the formation of a corpus luteum which results in the absence of a premenstrual endometrium and the low blood level of female sex hormone a day or two before the expected flow.

While the existence of anovular menstruation in some of these women cannot be proved without recourse to a laparotomy at the

onset of the menstrual flow, its existence, we believe, is a fair assumption. The follicle which fails to rupture, either through lack of hormonal stimulation from the anterior pituitary gland or inherent lack of vitality, undergoes cystic atresia so well described by Macomber²⁴ a year ago before this society. The cystic ovaries are usually the result of endocrine malfunction and not the primary cause of an existing functional sterility.

TABLE IV. (GROUP 2). FUNCTIONAL STERILITY ASSOCIATED WITH AMENORRHEA OR OLIGOMENORRHEA AND THE BLOOD HORMONE FINDINGS

	FEMALE SEX HORMONE LEVEL			PITUITARY HORMONE		
	NORMAL	THRESHOLD	NEG.	POS.	NEG.	TOTAL
Pituitary cases	5	4	34	0	43	43
Primary ovarian cases	0	2	8	8	2	10
Thyroid cases	0	1	3	Not obtained		4
Unclassified	2	1	6	0	9	9
Total	7	8	51	8	54	66

Functional Sterility Associated With Menstrual Derangements.—Of the 66 women in this group, 43 presented unmistakable evidence of pituitary hypofunction; 10 showed evidence of primary ovarian hypofunction; 4 were thyroid in type; and 9 remained unclassified. The correlation between menstrual derangements and the lack of a demonstrable quantity of female sex hormone is illustrated in Table IV.

Of the entire group of 66, only 15 showed either a normal or a threshold quantity of female sex hormone. This is in sharp contrast with the positive reaction obtained in 94 per cent of normal fertile women.

TABLE V. DIFFERENTIAL DIAGNOSIS OF ENDOCRINE STERILITY

	PITUITARY	OVARIAN	THYROID
Hypoplasia of generative organs	Marked	Marked	Moderate or absent
Menstrual derangements	Prolonged interval; scanty flow	Prolonged interval; scanty flow	Irregularity; menorrhagia
Obesity	Common; abnormal distribution of fat	Not common; usually underweight	Common; distribution is uniform
Amount and distribution of hair	Profuse; male distribution common	Normal or scanty; male distribution rare	Normal
Thyroid enlargement	Rare	Rare	Frequent
Kidney function	Impaired in some	Normal	Normal
Eye findings	Frequently abnormal	Normal	Normal
Sugar tolerance	Increased	Decreased	Normal
Basal metabolism	Lowered	Lowered	Very low
Female sex hormone	Low	Low	Low
Pituitary hormone	Not demonstrable	Demonstrable in over 50 per cent	Not known

Treatment of Functional Sterility.—Restoration of menstrual periodicity is important, but not essential. The term "normal menstruation" is employed in its literal sense, signifying the cyclic shedding

of a premenstrual endometrium and not merely uterine bleeding from an interval or hyperplastic endometrium. One of the amenorrheic women in this series who responded to organotherapy and other measures showed an interval endometrium when curetted a day before the expected onset of the menstrual flow. After periods of amenorrhea ranging from three to six months, she menstruated regularly for five consecutive months when the exploratory curettage was performed. Since then she has continued to menstruate regularly but at no time were we able to recover a demonstrable quantity of female sex hormone in her blood. We are convinced that the presence of a mouse unit of female sex hormone in 40 c.c. of blood, a few days before the expected cycle, is sufficient evidence of the presence of a functioning corpus luteum which is the only source of the hormone at this phase of the menstrual cycle. If the corpus luteum is producing a sufficient quantity of female sex hormone, it is reasonable to assume that it also produces lutein hormone which is essential in the preparation of the premenstrual endometrium. It is, therefore, unnecessary to curette these women for diagnostic purposes. The absence of a demonstrable quantity of female sex hormone (a duplicate test must be performed) a few days before the expected onset of menstruation in regularly menstruating sterile women may reasonably be taken as evidence that a normal corpus luteum has not developed and consequently that there is an absence of a properly prepared endometrium.

The thick hyperplastic endometrium so often found in irregularly menstruating women is the result of continued ovarian hypofunction, either primary or secondary to malfunction of the anterior pituitary gland. Its removal by means of the curette is sometimes followed by pregnancy without improvement in the menstrual rhythm.

Removal of foci of infection, especially in the group of relative sterility, is of utmost importance. The correction of a faulty diet deficient in vitamin E is equally important.

X-ray Treatment in Functional Sterility.—We obtained better results with x-ray stimulation of the ovaries and pituitary gland than with any other form of treatment. Six of the 38 sterile women with menstrual derangements, thus treated, were delivered of healthy offspring; 19 or 50 per cent are menstruating regularly; and 7 show

TABLE VI. RESULTS OF X-RAY TREATMENT IN FUNCTIONAL STERILITY ASSOCIATED WITH DERANGEMENTS OF MENSTRUATION

Normal menstruation reestablished (of these 6 carried to term)	19
Improvement in menstruation	7
No improvement	10
Made worse	2
Total	38

marked improvement in the menstrual rhythm. The remaining 12 were not benefited by x-ray treatment.

Primary ovarian failure, in some of which there is a compensatory hyperfunction of the anterior pituitary gland, as evidenced by the recovery of a mouse unit of anterior pituitary hormone from 6 c.c. of blood serum, should be treated by x-ray stimulation directed to the ovaries only. Irradiation of the pituitary gland in these cases is useless and probably harmful. In this series of 38 cases, only 2 were thus treated. Menstruation was reestablished in both; 1 of the 2 gave birth to a healthy infant.

In order to establish the primacy of the pituitary gland as the causative factor in the existing amenorrhea, 6 of this group received x-ray stimulation of the pituitary gland alone; of these, 3 are menstruating regularly, but thus far have not conceived; the other 3 were not benefited by the treatment. Simultaneous stimulation of the ovaries in the pituitary cases is theoretically sound.

Rubin²⁷ says: "Small doses of the latter (x-rays) applied first to the hypophysis and if necessary to the ovaries have proved successful, not only in restoring the menstrual periodicity to more nearly the normal in 80 to 90 per cent of the patients, but it has also incidentally increased their fertility to at least 50 per cent. Theoretical damage of the germ-plasm which is supposed to result from this treatment has, so far, not been demonstrated."

Drips²⁸ and others have also reported favorable results from low dosage irradiation of the ovaries or hypophysis in women with menstrual disturbances.

Irradiation of the ductless glands, if not properly applied, may do irreparable damage. Unfavorable results are due either to wrong diagnosis or faulty dosage. Where the ovaries or thyroid are primarily at fault, no effect can be obtained by irradiation of the pituitary gland, in fact, as indicated in the foregoing pages, harm may result. The tendency on the part of some roentgenologists to treat these cases without the aid of the clinician is bound to discredit the procedure.

We shall make no attempt to describe the technic of therapeutic irradiation of the ductless glands, except to note that 10 to 16 per cent of an erythema dose, given three times in the course of two weeks, has given us the best results, and that repetition of the course of treatments, in case of failure to obtain improvement, before the lapse of several months, has given us no beneficial results. On the contrary, 2 of these patients have been unfavorably affected. It is incumbent upon the roentgenologist to acquire the necessary information concerning the technic of low dosage irradiation of ductless glands before he attempts to treat these patients.

Results Obtained by Organotherapy and Other Measures in the Treatment of Functional Sterility.—Theoretically, organotherapy is purely substitutive. Clinically, there is evidence pointing to restoration of

function of the affected gland in some cases of endocrine malfunction. As a whole, organotherapy is sadly disappointing. We have at present fairly potent products of female sex hormone, but the endometrial cycle depends upon the balanced action of female sex and lutein hormones. The latter is not available for therapeutic use because of the meager source of supply. It is, therefore, apparent that the administration of female sex hormone alone may produce, at best, a pseudomenstruation if not followed up by the administration of lutein hormone. Even oral administration of female sex hormone in the form of Progynon pills has occasionally given us an improvement in the menstrual cycle. The dosage must be controlled by examination of the urine for female sex hormone by the Allen and Doisy test. The presence of a demonstrable quantity of the hormone in 12 c.c. of urine indicates that a sufficient quantity has been administered.

None of the ampoule preparations of female sex hormone tested in our laboratory contains the number of rat units specified on the label, probably due to the instability of aqueous solutions of the hormone. They retain, however, sufficient potency to produce the necessary effect in a few cases.

The oral administration of anterior pituitary extracts in cases of functional sterility, secondary to hypofunction of the anterior hypophysis, even when administered in massive doses (50 to 60 grains, daily) has proved, in our hands, even more disappointing than the use of ovarian products in primary ovarian deficiency. We have tested a number of samples of this product by the Aschheim-Zondek test and failed to find a demonstrable quantity of anterior pituitary sex hormone in any of them. Zondek,²⁹ who obtained a potent extract (Prolan) of the anterior pituitary lobe from the urine of pregnant women, reports favorable results in the treatment of menstrual derangements by daily intramuscular administration of 200 rat units of Prolan during the first 9 days, followed by daily administration of 40 to 500 mouse units of female sex hormone during the subsequent twenty days. This is a rather costly course of treatment which few of our patients can afford. Moreover, we made repeated attempts to import Prolan without success.

TABLE VII. RESULTS OBTAINED BY ORGANOTHERAPY AND OTHER MEASURES

	REGULAR MENSTRUATING WOMEN TOTAL	AMENORRHEIC AND OLIGOMENORRHEIC WOMEN TOTAL
Delivered	3	6
Aborted	1	1
Menstruation improved	0	5
No results	33	16
Total	37	28

The administration of thyroid extract, even in those women who show no apparent deficiency of thyroid function, has apparently given us favorable results in some cases. It is, however, difficult to evaluate the efficacy of organotherapy because other measures equally important, as elimination of foci of infection, correction of diet, and hygienic measures are simultaneously employed.

In this small series of cases the 9 pregnancies in those treated with glandular extracts represents a percentage of success relatively as high as in the group of women treated by low dosage irradiation. However, the percentage of relief from menstrual derangements, through the agency of the latter, is much higher.

The low percentage of succeeding pregnancies in this series of 103 treated cases is, in our opinion, due to the inclusion of only those cases of long-standing sterility presenting definite stigmas of endocrinopathies.

SUMMARY AND CONCLUSIONS

The dependence of ovarian function upon hormonal stimulation from the anterior pituitary gland and the compensatory hyperfunction of the latter in cases of primary ovarian failure are herein emphasized.

The normal menstrual cycle depends upon the balanced activity of the two ovarian hormones; the female sex hormone generated by the graafian follicle produces growth and vascularization of the uterus, the lutein hormone generated by the corpus luteum produces premenstrual endometrial changes preparatory to the reception of a fertilized ovum.

Evidence is given that 16 of the group of 37 regularly menstruating sterile women were probably subject to anovular menstruation as shown by the simultaneous absence of a premenstrual endometrium and a demonstrable quantity of female sex hormone a day or two before the onset of the expected flow.

The Frank and Goldberger test for the blood level of female sex hormone is of great value in the diagnosis of functional sterility in regularly menstruating women, but is of little value in the diagnosis of this condition associated with menstrual derangements.

The recovery of a demonstrable quantity of anterior pituitary sex hormone from the blood of women suffering from functional sterility is pathognomonic of primary ovarian failure. Normal fertile women and those suffering from pituitary hypofunction rarely, if ever, show a demonstrable quantity of the hormone except during pregnancy.

Low dosage irradiation of the affected endocrine glands was successful in reestablishing menstrual periodicity in more than 50 per cent of 38 women thus treated; organotherapy is far less effective.

The number of succeeding pregnancies is relatively equal in the two groups treated, respectively, by x-ray stimulation and organotherapy.

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1829 PINE STREET.

Molinengo: Autotransplants of Endometrium in the Peritoneum of Rabbits. Ann. di ostet. e ginec. 52: 309, 1930.

The author from various experiments on rabbits concludes:

In the rabbit the autoplasmic attachment of small particles of endometrium and uterine musculature in the peritoneal cavity is possible, also without any particular preparation of the serosa. The attachment may be achieved at any special point of the peritoneal serosa, whenever a proper preparation for the transplant has been made.

The attached uterine particles after further development produce papillary or cystic tumors, in which the characters of the epithelium, and the relative, muscular, and epithelial arrangement resemble the musculo-epithelial structure of the adenomyomas in woman.

The hormonal action of the ovary does not appear to have an appreciable influence on either the attachment of uterine particles or on the development of tumefactions.

SYDNEY S. SCHOCHET.
JULIUS E. LACKNER.

STUDY OF THE CALCIUM-PHOSPHORUS RATIO IN THE SERUM OF SYPHILITIC PREGNANT WOMEN*

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IT IS well known that calcium and phosphorus are intimately concerned in bone metabolism, that there is a disturbance of calcium and phosphorus metabolism in pregnancy, and that pathologic involvement of the osseous system is a frequent accompaniment of congenital syphilis. We are unaware of any reported studies of the osseous system in congenital syphilis which concern an investigation of the calcium-phosphorus ratio in the sera of syphilitic pregnant women.

The foregoing considerations motivated the study herein reported. Our purpose was to determine the calcium-phosphorus ratio in pregnant women infected with syphilis and to compare this with the ratios of pregnant women not infected with syphilis, and nonpregnant women, with and without syphilitic infection.

Accordingly, the calcium and phosphorus were determined in the sera of about ten patients in each of the four groups, a total of 46 different patients. The majority were white, all were within the childbearing period excepting 3 patients who were around fifty years of age. In the pregnant women group, of 24 patients studied, 16 were in the seventh, eighth or ninth month of pregnancy; 5 were in the sixth month and the remaining 3 were in the third and fifth months. The pregnancy was normal in this group.†

In the syphilitic group, the sera of all patients yielded a 4-plus Wassermann reaction. Patients who were pregnant and infected with syphilis, presented no clinical manifestations of syphilis. From the history, the infection was apparently of long duration; the majority were previously untreated.

In the group not infected with syphilis, the sera of the patients yielded a negative reaction, and there was no reason to suspect a syphilitic infection.

METHODS EMPLOYED FOR DETERMINATIONS OF CALCIUM AND PHOSPHORUS.

NORMAL VALUES FOR TOTAL SERUM CALCIUM AND PHOSPHORUS

Determinations of calcium were made according to Tisdall's modification¹ of Kramer and Tisdall's method. Determinations of phos-

*Read at a Meeting of the Obstetrical Society of Philadelphia, November 6, 1930.

†These were ward patients in the service of Dr. Lida Stewart Cogill at the Woman's College Hospital.

phorus were made according to Benedict and Theis.² Blood was withdrawn from patients on a fasting stomach. Serum was separated from the blood as soon as it was withdrawn from the vein and examined at once. In some instances the serum was left on ice and examined within twenty-four hours.

Normal values for total serum calcium were regarded as 9 to 12 mg. per 100 c.c. of serum; phosphorus, 3 to 4 mg. per 100 c.c. of serum. The normal calcium-phosphorus ratio was regarded as about 3.0.

RESULTS OF STUDY

The results are shown in Table I. It will be seen that values for calcium and phosphorus, the calcium-phosphorus ratio and calcium-phosphorus product were essentially not different in the pregnant women who were syphilitic from those women not infected with syphilis. It is to be noted, however, that patients in the pregnant women group showed low normal values for calcium, low and low normal values for phosphorus, a slightly higher ratio and lower figure for calcium-phosphorus product than the women who were not pregnant. Phosphorus values were affected more than calcium in the pregnant women group, the average figure being 2.065, compared to 3.25 in the nonpregnant women group; whereas, the average figure for calcium was 9.35, compared to 10.0 in the nonpregnant women group.

Our results pertaining to low total serum calcium values in pregnant women are consistent with studies, notably of Coons and Blunt³ and of Macy, Hunscher, Nims and McCosh,⁴ which show that in pregnant women there is a disturbance of calcium and phosphorus metabolism. Such disturbance has been observed in pregnant cows, by Forbes⁵ and his coworkers, and in pregnant rats, by Goss and Schmidt.⁶

A number of other investigators have reported low total serum calcium values in pregnant women. Bokelmann and Bock⁷ observed an average of 10.0 mg. in normal nonpregnant women; 9.6 mg., from the second to the fifth month of pregnancy; 9.4 mg., from the sixth to the tenth month; 9.7 mg., at the beginning of labor, and 9.8 mg. during the lying-in period.

In the first five months of pregnancy, the average calcium was 9.04 mg., and in the last five months, 9.76 mg. as observed by Rodecurt, Koenig and Regenburger.⁸

Bogert and Plass⁹ studied the calcium and magnesium values in a large series of cases. They concluded that there is a definite and consistent lowering of the total serum calcium during pregnancy. This tendency was more marked toward the end of the period of gestation. Fifty per cent of the women examined in the last five months of pregnancy, showed calcium below the lowest values observed in nonpregnant women, while the same diminution was found in only 22

TABLE I. SHOWING VARIATIONS IN CALCIUM AND PHOSPHORUS IN PATIENTS STUDIED

NONSYPHILITIC										
NONPREGNANT					PREGNANT					
NO. *	AGE	Ca	P	$\frac{Ca}{P}$	Ca × P	AGE	MONTH OF PREGNANCY	Ca	$\frac{Ca}{P}$	Ca × P
1	54	10.4	3.1	3.2	32.2	16	9	9.0	2.6	31.5
2	16	10.2	3.0	3.4	30.6	26	5	9.4	3.7	23.5
3	18	9.5	3.8	2.5	35.1	—	9	10.2	3.4	30.6
4	53	9.6	3.4	2.8	32.6	—	9	9.2	3.2	24.7
5	21	11.2	3.9	2.9	43.7	—	8	9.5	3.6	24.7
6	20	9.4	3.7	2.5	34.8	18	6	9.2	3.4	24.8
7	18	9.9	3.5	2.8	34.7	45	7	8.3	3.9	19.9
8	38	10.0	3.0	3.3	30.0	21	5	9.1	3.3	25.5
9	40	9.6	3.6	2.7	34.6	25	7	8.8	3.2	24.6
10	32	10.2	2.6	3.9	26.5	19	3	9.6	3.0	30.7
Average		10.0	3.3	3.0	33.5	29	8	9.3	3.3	26.0
						Average		9.2	2.6	
SYPHILITIC										
11	18	9.6	3.2	3.0	29.6	24	9	11.0	3.3	36.3
12	21	11.8	3.0	3.9	35.4	26	9	9.1	2.9	26.4
13	34	9.9	2.8	3.5	27.7	18	6	9.8	3.6	26.5
14	26	10.1	3.4	3.0	34.3	—	9	9.7	3.5	34.0
15	17	9.4	3.8	2.5	35.7	—	8	9.1	2.6	23.7
16	16	9.4	3.0	3.1	28.2	23	7	9.6	2.0	19.2
17	50	10.1	3.5	2.9	35.4	26	6	9.4	2.2	20.7
18	27	9.8	2.6	3.8	25.5	30	7	10.4	3.0	31.2
19	32	9.8	3.4	2.9	33.3	32	6	9.4	3.1	29.1
20	28	9.6	3.6	2.7	34.6	21	8	9.2	3.3	25.8
21	32	10.8	3.2	3.4	34.6	21	6	9.0	2.9	26.1
22	25	9.7	3.0	3.2	29.1	—	8	9.4	2.4	22.6
Average		10.0	3.2	3.1	31.8	19	8	8.8	2.2	19.4
Grand Av.		10.0	3.25	3.05	32.7	Average		9.5	3.5	24.7
						Grand Av.		9.35	2.065	25.4

per cent of those examined in the first half of pregnancy. No values below the normal range were noted in the first eight weeks of gestation.

In comparison with calcium, much fewer studies of the phosphorus content of the blood in pregnancy have been reported.

In Krebs' and Briggs'¹⁰ study of the calcium and phosphorus content of the blood in normal pregnancy, they concluded that there is a great constancy of all these elements, regardless of the period of gestation, with the exception of calcium, which is slightly lowered in the last weeks. One notes, however, that in their study, the average phosphorus value for 10 pregnant women was 2.5 mg.

In Stander, Duncan and Sisson's studies,¹¹ the phosphorus content of the blood in pregnancy was not different from that in nonpregnant women.

Low normal calcium and phosphorus values in pregnancy as observed in this study are perhaps consistent with the great alteration of calcium and phosphorus metabolism occurring in cows. There is a disease known as parturient paresis or "milk fever" and likewise occurs in sheep ("lambling sickness"). Through the studies of Little and Wright,¹² Dryerre and Greig¹³ and Fish,¹⁴ this disease is shown to be accompanied by considerably decreased calcium content of the blood serum, and Fish has shown that the phosphorus content is likewise considerably decreased. Symptoms of tetany which characterize the disease are thus explained. These symptoms are promptly relieved by calcium administration.

SUMMARY AND CONCLUSIONS

1. Total serum calcium, inorganic phosphates, the calcium-phosphorus ratio and calcium phosphorus product were not different in pregnant women infected with syphilis from those in pregnant women not infected with syphilis.

2. In 24 pregnant women, late in pregnancy, the average total serum calcium was 9.35 mg. per 100 c.c. of serum; inorganic phosphates, 2.065 mg.; calcium-phosphorus ratio, 3.4, and calcium-phosphorus product, 25.4; whereas, in 22 nonpregnant women in the child-bearing period, the average total serum calcium was 10.0 mg.; inorganic phosphates, 3.25 mg.; calcium-phosphorus ratio, 3.05, and calcium-phosphorus product, 32.7.

3. Low normal values for total serum calcium and inorganic phosphates in pregnant women are perhaps consistent with the studies of others, which show that there is a disturbance of calcium and phosphorus metabolism in pregnant women, cows and rats, and disturbance of such metabolism in the disease known as parturient paresis or "milk fever" in cows and sheep.

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1934 SPRUCE STREET.

2101 PINE STREET.

(For discussion, see page 120.)

TREATMENT OF CERVICITIS BY CAUTERY AND ELECTROCOAGULATION

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IT IS necessary to classify the benign pathologic lesion of the cervix uteri before attempting treatment by actual cauterization or by electrocoagulation, for the different structural elements of the lesions are much more amenable to one form of treatment than to the other.

Actual cauterization destroys tissue by carbonization and the retraction of cicatricial tissue that results should be kept in mind. Electrocoagulation, with or without carbonization, gives a different result, depending upon the depth of the coagulation and the degree of carbonization. It must also be borne in mind that cauterization with the actual thermocautery heats from the surface inward and must, of necessity, destroy the surface first before any appreciable heat penetration can take place. On the other hand, by electrocoagulation maximum heating may and does take place in the deeper structures before the superficial structures become coagulated.

Recent literature on cauterization in cervicitis has established the efficacy of this method of treatment, yet F. C. Holden states that in a review of 500 case records, the following contraindications to cervical cauterization should be kept in mind: (1) Where the disorder is one of several requiring operation; (2) slight inflammation, without eversion or erosion; (3) simple edemas, and (4) "those that do better on other treatments after trial of cautery." Cystic cervicitis was found in one case out of four in his series. He feels that the occurrence of cysts high in the canal is quite common and that for this reason a preliminary cauterization would lessen the extent of operative procedure.

R. C. Chaffin recommends that in cases of cystic cervicitis the surface cysts should be opened by knife puncture and their contents expressed with sponge forceps. He describes fulguration of the deeper portion of the cervix by twenty to thirty stab punctures with the fulgurating needle. He used the Percy cautery extensively, but advised the Sturmdorf operation in the nonlacerated cystic cervicitis group.

F. L. Payne gives the following comparative percentages: Cauterization gives 93 per cent improvement in 70 cases; trachelorrhaphy 96 per cent improvement in 24 cases; and in 77 cases studied, the modified Sturmdorf procedure gave 95 per cent improvement.

Louis Phaneuf prefers the treatment of simple lacerations with cautery and diathermy, but recommends the Sturmdorf operation for severer forms of endocervicitis.

In a study of over one thousand cases of cervicitis in The Mayo Clinic, Masson and Parson state that the cautery is as effective as amputation in the cure of leucorrhea, that pregnancy occurs more often, miscarriages are less frequent, labor is more often normal and lacerations occur less frequently following cauterization of the cervix than by amputation.

G. Kolischer states that surgical diathermy has a wide field of usefulness in gynecology, and makes special reference to coagulation of the cervix in cancerous lesions prior to radium implantation.

Gellhorn points out that in electrocoagulation the heat penetration extends far more deeply into the tissues than if fulguration or electric cautery were used. He refers to the work of A. H. Curtis in electrocoagulation together with radium in the treatment of carcinoma of the cervix.

G. E. Ward advised the use of a biterminal, comparatively low voltage, high amperage current to fulgurate the cervix in mild cases of endocervicitis, but recommends the use of cautery, as hemorrhage is less apt to occur in cases of extensive cystic cervicitis when the cautery is used.

The opposite opinion is held in cases of cystic cervicitis in the series reported by the author in this paper, as no hemorrhage has followed the electrocoagulation of cervical tissue in these cases. The possible explanation may be that tissue coagulation is instantaneous in the localized area about the knife blade electrode used by the author. The resulting coagulum is not mechanically removed but is allowed to separate as a slough.

If the types of pathologic lesions of the cervix uteri were classified as to their structural difference, some agreement might be reached as to the preferable method of treatment recommended. If cervical tissue can be destroyed by actual thermal cautery, or destroyed by electrocoagulation, why not use the different action of these two methods to bring about the structural tissue changes best suited to the correction of the lesion?

The following classification of pathologic lesions of the cervix is based upon the clinical diagnosis and represents only a proposed outline as to the best treatment recommended in each type, keeping in mind the above stated differences in the essential action of thermocauterization and electrocoagulation.

The types of cervicitis are, for convenience, divided into: First, the

chronic cervicitis group, and second, the recent postpartum cervicitis group of perhaps six to eight weeks after delivery.

CHRONIC CERVICITIS GROUP

1. Laceration with so-called erosion.*
2. Laceration with erosion and eversion.†
3. Erosion without laceration.
4. Cystic cervicitis.
5. Endocervicitis.

RECENT, SIX TO EIGHT WEEKS POSTPARTUM CERVICITIS

1. Laceration without erosion.
2. Laceration with erosion and eversion.
3. Erosion.
4. Endocervicitis.

TECHNIC OF CAUTERIZATION WITH THE ACTUAL THERMOCAUTERY IN THE CHRONIC CERVICITIS GROUP

The cervix is exposed by means of a bivalve speculum, the lateral vaginal walls may conveniently be protected by wooden applicators, or a four-blade vaginal speculum may be used. All moisture is removed from the surface of the cervical canal in order to avoid steam, productive of uterine and tubal colic. Usually it is not necessary to hold the cervix with a tenaculum forceps during the procedure. No local or general anesthesia or analgesia is used. The procedure is easily carried out in the office without marked discomfort to the patient before or after the operation.

Procedure in Type 1.—(Chronic Cervicitis Group.) (Lacerations without Erosion.) The cautery knife blade is quickly passed while hot into the cervical canal at a point deeper than the base of the laceration. This point becomes the bottom of a V-shaped incision which is quickly made well out onto the anterior and posterior lateral cervical lips, burning well into the cervical tissue, so that the maximum eschar occurs at the base of the V-shaped incision.

When this burned area sloughs out, marked retraction takes place at the point of the "V," and this cicatricial contraction will pull the anterior and posterior everted cervical lips together and the freshly denuded area will heal when so approximated. This V-shaped incision is done bilaterally in most cases; retraction is then equal on both sides. If the laceration is deeper on one side, a deeper incision is burned on that side.

Sometimes it becomes necessary to repeat this procedure once or, rarely, twice to attain the desired retraction to approximate the sides of the laceration. If the

*By erosion is meant the columnar epithelial proliferation on the outer portion of the cervical rim replacing the normal stratified epithelium normally found there.

†There is much confusion regarding the terms "erosion" and "eversion." Martzloff describes eversion of the cervical mucosa as associated with endocervicitis without mechanical injury to the cervix, such as lacerations. This lesion he states is sometimes called an erosion. In cases of laceration as from childbirth, eversion of the cervical lips is due to inflammation followed by scar tissue, which through contraction, produces an ectropion or lipping of the cervix. Hence, the usefulness of the V-shaped incision, described later under technic, to place the contraction of the newly formed scar tissue by cauterization further back in the cervical canal in order to close the lipping. It is in this sense that eversion is referred to in this paper.

True erosion of the cervix does occur, but rarely. Loss of surface epithelium which is replaced by a necrotic membrane beneath which typical granulation tissue is seen is, according to Martzloff, the origin of the small granulation tissue tumor of the cervix.

C. P. Fluhmann describes a process of epidermalization by which is meant that the normal cylindrical epithelium of the cervix is replaced by a stratified squamous epithelium.

anterior and posterior cervical lips are so thickened as to prevent proper lateral approximation, they must be reduced in size by electrocoagulation or by radial incision through the lips with the cautery, so that better lateral approximation with healing will do away with the eversion.

Much of the erosion will be taken care of in this manner, as the healing of the bilateral laceration will correct the eversion, hence the columnar epithelium will no longer be exposed to the trauma of acid vaginal excretion.

The term "eversion" here means rather the actual structural turning out of the thickened cervical mucosa because of bilateral cervical lacerations and fibrosis with perhaps cystic formation as caused by "erosion." The production of

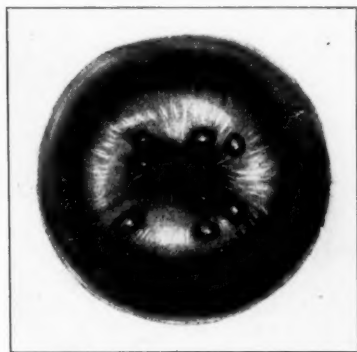


Fig. 1.

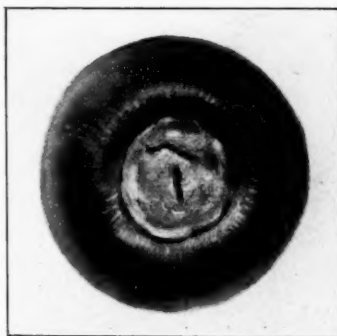


Fig. 2.

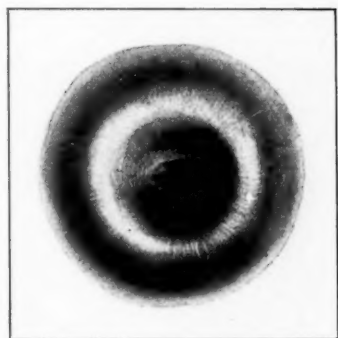


Fig. 3.

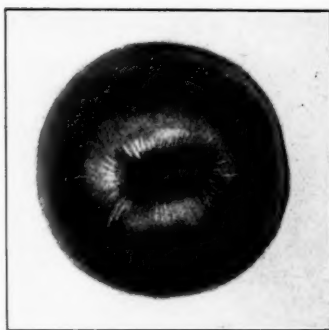


Fig. 4.

Fig. 1.—Chronic cystic cervicitis with eversion and erosion. The lighter colored area denotes erosion with some eversion. The type of case to be treated with electrocoagulation.

Fig. 2.—Ten days to two weeks after electrocoagulation (same as in Fig. 1), showing sharp line of demarcation between coagulum and normal cervical tissue. Slough loose but not fully separated.

Fig. 3.—Three and a half to four weeks after electrocoagulation (same as in Fig. 1 and 2). Coagulum separated with slough entirely out. Turning in not completed. Mixture of stratified and columnar epithelium now lining the cervical canal.

Fig. 4.—Five to six weeks after electrocoagulation (same as in Fig. 3), healing with stratified epithelium lining the canal completely. Cervical lips rolled in.

Nabothian cysts (cystic cervicitis) occurs as the columnar epithelium proliferates and blocks the openings of the racemose glands. The lining of the cysts is stratified epithelium.

Eversion, so-called, without erosion, is rare. In this incidence the more or less normal columnar epithelium may appear as an erosion because, by virtue of the bilateral laceration, the lining of the endocervical canal is mechanically exposed. In all

cases where laceration exists, attempt is made to close the lacerated area by a V-shaped, burned incision before cauterizing or electrocoagulating the everted or eroded area.

Procedure in Type 2.—(Laceration with Erosion and Eversion.) Same technic as for lacerations until the turning in takes place, then electrocoagulation of the eroded area with superficial fulguration (bipolar).

TECHNIC OF CAUTERIZATION WITH ACTUAL THERMOCAUTERY IN RECENT POSTPARTUM CERVICITIS (CASES SIX TO EIGHT WEEKS POSTPARTUM)

Type 1.—(Laceration without Erosion.) A round, blunt-tip cautery point, the size of the lead in an ordinary lead pencil and about two-and-a-half inches long, is passed, while hot, into the cervical canal and laterally to the base of the laceration, and is pressed well out laterally and held there some five to eight seconds.



Fig. 5.—Cross-section drawing of uterus and cervix. High frequency knife electrode undermining the cervical lips. Large, conical-shaped coagulated cone (the apex of which is at the level of the inner os) will slough out, with complete healing with stratified epithelialization of the cervical canal four to six weeks later.

Type 2.—(Laceration with Erosion and Eversion.) Technic same as with lacerations. Erosions may also be cauterized (carbonized), but only superficially. It is best to cauterize erosions at least one week, or later, after cauterization of the lacerated area has sloughed.

Type 3.—(Erosion.) Superficial destruction with carbonization by actual cautery, or with superficial electrocoagulation, followed by fulguration (bipolar) with slight carbonization.

Type 4.—(Endocervicitis.) In cases six to eight weeks postpartum, in my opinion, it is best to pass the actual thermocautery well into the endocervical canal for a sufficient time only to carbonize the external endocervical glands. I feel this is better than electrocoagulation in the recent postpartum group, as destruction with the thermocautery when properly carried out is much more superficial than electrocoagulation.

TECHNIC OF ELECTROCOAGULATION

The machine is set to deliver the optimum current flow. Operation on the machine should be entirely by a foot switch control. The cervix is exposed by means of a bivalve speculum, as in the case of actual thermocauterization. However, it is not necessary to protect the lateral vaginal walls, as the generated heat is confined to the tissue that is being coagulated. All moisture is removed from the cervical canal to avoid steam, productive of uterine and tubal colic. No local anesthesia is used and the procedure may be carried out in the office without marked discomfort to the patient either during or after the operation. Hospitalization and the use of analgesia or anesthesia may be desirable in the case of nervous, apprehensive patients.

The electrode is usually of a small curved knife-blade type, which may be buried in the tissue if desired, or simply pressed against the tissue that is to be coagulated. The instrument is passed to the site of proposed coagulation and the foot switch depressed and held for sufficient time (usually ten to fifteen seconds) to produce the desired coagulation in any given area. In order to carbonize, it is only necessary to hold loosely the electrode blade against the desired tissue, so that active sparking may take place. The passive electrode is the usual abdominal belt.

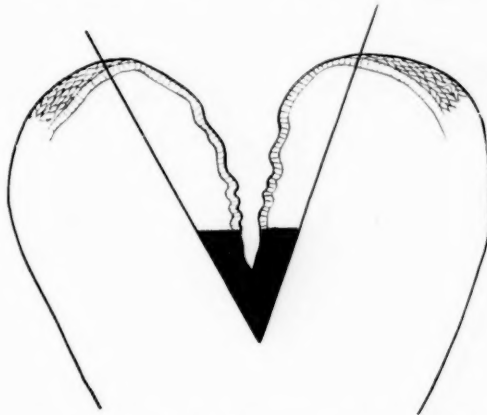


Fig. 6.—Diagrammatic drawing to illustrate V-shaped incision made by actual thermal cautery in the treatment of lacerated cervicitis. The point of the "V" is made $\frac{1}{2}$ to 1 cm. farther up in the cervical canal than the apex of the laceration. The area in black represents the carbonized cicatricial contraction that will close the everted cervical lips.

CHRONIC ENDOCERVICITIS GROUP

Type 2.—(Erosions with previously healed cauterized lacerations by V-shaped burning technic.) If the erosions are on markedly thickened cervical lips, electrocoagulation will sufficiently destroy this thickness to amply take care of the erosion as well. If, however, the erosion is on nonhypertrophied anterior and posterior cervical lips, the more superficial fulguration (bipolar) with subsequent carbonization by permitting loose contact between the surface of the cervix and knife electrode blade will give the desired result.

Type 3.—(Erosions without laceration.) Here, superficial or deep destruction of the cervical lips by coagulation followed by light bipolar fulguration is used, as in Type 2.

Type 4.—(Cystic cervicitis.) In my opinion this type of chronic cervicitis may most adequately be treated by electrocoagulation. It has been observed that in opening the Nabothian cysts of the cervix by a simple puncture, a purulent, mucoid material may readily be expressed. However, this procedure actually seems to flare up a subacute or chronic infection and produces an undesirable exacerbation of the pelvic cellulitis which is so often associated. If the actual thermocautery is

used in these cases, very extensive cervical tissue destruction accompanies the destruction of the Nabothian cysts, and, in my opinion, excessive carbonization that accompanies the actual thermocauterization seems to seal in infected material, and quite commonly produces an acute pelvic cellulitis.

The Sturmdorf operation is often recommended for chronic cystic cervicitis. The removal of a cone-shaped area from the endocervical canal will, of course, take care of these hypertrophied Nabothian cysts. As a substitute for the Sturmdorf operation, I feel at the present time, electrocoagulation will give as good results, without the untoward results of this operation, and certainly with much less carbonization of cervical tissue than when actual cauterization is employed.

TECHNIC OF ELECTROCAUTERIZATION TREATMENT IN CYSTIC CERVICITIS

The electrode knife blade is pressed firmly over the Nabothian cyst, the fluctuation of the cyst easily giving the proper site for spot placing of the electrode. When the foot switch is depressed, the high frequency current generates almost instantaneously sufficient heat in the Nabothian cyst to cause rapid expansion of the cystic contents. This heat is generated within the cyst and deeper cervical tissues. The weakest point for rupture of the cyst is the site of electrode pressure and the cyst will literally blow up at this point, discharging its entire contents in the form of steam and cystic debris. Each cyst of the cervix is treated in like manner and it is quite surprising to observe the immediate collapse of the previously, chronically thickened cervical lips which have been greatly distended, due to the presence of these multiple cysts.

After all the large cysts are thus collapsed, it is quite safe to coagulate more deeply the remaining cervical tissue, and it is quite possible to coagulate a cone-shaped area analogous to the area that would be removed by the Sturmdorf operation. The top or peak of this cone can well be carried up into the internal os and can be made to include all infected glands and cysts that might be present. After ten days to two weeks this coagulated, conical area will separate in one piece, or, as in most cases, will be disintegrated in the form of a profuse discharge. There is a clean-cut line of demarcation between slough and healthy tissue of the cervix. After the slough is out, the epithelialization of the denuded area is very rapid. Little islands of stratified epithelium can be seen even while the slough is proceeding.

Type 5.—(Endocervicitis.) In the chronic endocervicitis group, I feel that destruction by means of electrocoagulation is to be preferred to the thermal cauterization of the endocervical canal, for this reason: If the endocervicitis is chronic, the deep racemose glands of the endocervical canal are sure to be infected all the way to the base of the glands and cannot be reached with the actual thermocautery without marked destruction of the cervical tissues, which may not be advisable. In electrocoagulation the heat is generated from within out, and excessive superficial tissue destruction with subsequent cicatrix can be avoided.

I should like to review the above classifications and briefly give the reasons in summary form as to when cauterization and when electrocoagulation is to be used. In case of a recent postpartum laceration, or a laceration in a chronic cervicitis, it is advisable to destroy the cervical tissue to the point of retraction caused by subsequent scar tissue, in order to close this laceration; in such cases the use of actual thermocautery is advised. In the healing process of such lacerations, normal epithelium will follow down and over the laceration area, which is nicely pulled together by the subsequent tissue retraction.

Actual thermocauterization is preferred to electrocoagulation in the

recent postpartum erosion and recent postpartum endocervicitis, as in these cases infection is usually superficial and the deeper cervical portions and racemose glands are not so extensively involved as in cases of chronic cervicitis.

In the chronic cervicitis group electrocoagulation, with or without fulguration, will certainly more adequately destroy the deeper cervical tissue. Reference to Table I will give at a glance the proposed different methods of treatment for the various types of cervicitis.

TABLE I

Chronic Cervicitis					
TYPE OF TREATMENT ADVISED	I. LACERATION WITHOUT EROSION	II. LACERATION WITH EVER- SION AND EROSION	III. EVERSION WITHOUT LACERATION	IV. CYSTIC CERVICITIS	V. ENDO- CERVICITIS
Actual thermal cautery	Used	Used	Not used	Not used	Not used
Electrocoagulation with bipolar fulguration	Not used	Used	Used	Used	Used
Recent Postpartum (6 to 10 wk.) Cervicitis					
Actual thermal cautery	Used	Used	Used		Used
Electrocoagulation with bipolar fulguration	Not used	Not used	Used		Not used

CONTRAINDICATIONS FOR CAUTERIZATION AND ELECTROCOAGULATION OF THE CERVIX UTERI

1. Pregnancy or suspicion of pregnancy.
2. Acute cervical infection, or any acute or subacute tuboovarian inflammation, or subacute pelvic cellulitis. A subsiding subacute or beginning chronic condition of the cervix, with subsiding subacute or chronic tuboovarian disease, may safely be treated.
3. A patient two weeks or less premenstrual or before three to four days postmenstrual.

It is not advisable to coagulate or cauterize the cervix of a patient in the cancer age without first obtaining a biopsy, as biopsies taken after such a procedure give a picture of a pseudomalignancy.

This analysis of proposed treatments is based upon extensive use of the actual cautery in both recent postpartum cervicitis and chronic cervicitis during the past two years in the Out-Patient Dispensary of the Washington University School of Medicine, and in private practice, and covers several hundred cases. The average age incidence of patients treated was about thirty years. The use of electrocoagulation by the author is more recent, has been carried out for only six months, and the number of cases has been correspondingly smaller. However, I feel that it is of importance to classify the types of cervicitis and recommend neither the exclusive use of the actual cautery

TABLE II

CLINICAL OBSERVATIONS ON THE FOLLOWING TYPES OF CERVICITIS STUDIED	STRATIFIED EPITHELIALIZATION COMPLETED		ANATOMIC CLOSURE OF EVERSION COMPLETED		INCIDENCE OF BLOODY DISCHARGE AFTER TREATMENT NO. OF CASES	DURATION OF BLOODY DISCHARGE AFTER TREATMENT		CESSATION OF MUCO- PURULENT DISCHARGE	
	4 WK.	6 WK.	4 WK.	6 WK.		2 WK.	3 WK.	4 WK.	6 WK.
NUMBER OF CASES									
Cystic cervicitis with eversion, erosion and endocervicitis 37 Cases	12	25	10	27	10	6	4	30	7
Eversion with marked ectropion, without cystic cervicitis or endocervicitis 5 Cases	4	1	4	1	1	1	0	3	2
Endocervicitis without ectropion, eversion or erosion 2 Cases	-	-	-	-	0	0	0	2	-

A total number of 44 cases of cervicitis was studied over a period of six to eight weeks, at weekly intervals after electrocoagulation procedures were undertaken.

No cases required packing for hemorrhage. No cases of pelvic peritonitis or pelvic cellulitis occurred.

All cases showed marked clinical improvement. There was no incident of stenosis.

nor of electrocoagulation, but a combination of both in an endeavor to obtain the best results by means of each method. I feel that only by such classifications and clinical study will the treatment of cervicitis be placed on a rational basis.

CLINICAL RESULTS OBTAINED

Since the combination methods have been used it seems that all cases have been much improved. Anatomically, the healed cervix resembles a good postoperative result. In the case of laceration better results are obtained in most cases than where trachelorrhaphy was performed; and electrocoagulation, it is felt, will probably replace the Sturmdorf operation for the chronic cystic cervicitis group. Certainly, in the absence of other than cervical pathology requiring operative treatment, cauterization and electrocoagulation should be attempted before subjecting the patient to hospitalization for operative trachelorrhaphy or the Sturmdorf procedure.

The end-results in the cystic cervicitis group with electrocoagulation removal of a conical area of affected cervical tissue from the endocervical canal in all the cases of this series showed as good healing and as good turning-in with epithelialization of the denuded area as with a previously observed series of fifty consecutive Sturmdorf operations.

All cases showed a cessation of vaginal discharge as soon as the slough was out. All local and systemic lesions attributed to cervicitis were improved by cauterization or electrocoagulation methods in all cases involved. There was no incident of stenosis.

This work done by the author was sponsored by Dr. G. D. Royston who, for the past year, has been in charge of diathermy work on the female pelvis in the Department of Obstetrics and Gynecology, Washington University School of Medicine.

On May 12, 1930, Dr. Royston read a paper before the Washington University Medical Society, which was a preliminary report of the effect and application of Medical Diathermy in chronic pelvic inflammation. Dr. Royston will make reference in a further publication to the effect of this new surgical electrocoagulation in cervicitis in aiding medical diathermy treatments in controlling general pelvic inflammatory processes.

Dr. F. H. Ewerhardt, Director of the Department of Physical Therapeutics, Washington University School of Medicine, supplied the necessary diathermy apparatus for the work and aided with many valuable suggestions.

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BEAUMONT MEDICAL BUILDING.

ANATOMIC CHANGES SUBSEQUENT TO THE RADIOTHERAPEUTIC TREATMENT OF BENIGN UTERINE CONDITIONS*

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INTRODUCTION

THE purpose of this study is to present the observations made over a period of several years on a series of cases of benign uterine conditions treated by x-ray and radium in an attempt to answer some still debated questions, particularly the effect of this form of treatment on the size of the myomatous uterus; the importance of x-ray and radium as excitants of latent infections; the frequency and importance of subsequent changes within the tumor, such as degeneration and sarcoma; the occurrence of carcinoma of the body and neck of the uterus and diseases of the tubes and ovaries, especially those conditions which were overlooked at the time the treatment was given and later became apparent. These answers can only be determined by prolonged follow-up examination, which will reveal what proportion of these potential conditions actually occur. Without this fact finding, isolated instances of complicating disease or, on the other hand, some brilliant triumph will overshadow the mass of less dramatic results.

The material consists of 434 patients, of whom 393 have been followed for varying lengths of time (Table I); 53 for one year, 80 from two to three years, 79 from four to five years, 136 from six to ten years, 42 from eleven to fifteen years, and 3 for over fifteen years, making an average follow-up period of seven years. While the total

TABLE I. FOLLOW-UP STATISTICS

Patients not followed		41
Patients followed	1 year	53
	2-3 years	80
	4-5 years	79
	6-10 years	136
	11-15 years	42
	Over 15 years	3
Total		393
Total patients treated		434
The average follow-up period is seven years.		

number is not great, and while the period of observation in many cases is not as long as we should like, it is felt that from these obser-

*Read at a meeting of the New York Obstetrical Society, November 11, 1930.

vations, we may appraise the probability of occurrence of the various complications even if precise statistical calculations cannot be made.

At present we are not concerned with the effect of this form of treatment upon symptoms, nor with the question of the artificial menopause; these have been thoroughly discussed in the literature and are themselves subjects of major importance.

IMMEDIATE DANGERS

The immediate dangers and injuries from radium and x-ray therapy appear so prominently in discussions of radiotherapy, that they will be briefly mentioned, although our present study concerns more the distant effects. Burns, while still possible, are of such rare occurrence that one had better refer to the older literature for information. Slough of a degree sufficient to cause distress resulted in two cases. One was in the region of the cervix where three biopsy specimens had been removed because of previous doubtful microscopic diagnosis of epithelioma. It is believed that the circulation was so disturbed by the excisions that the ordinary superficial destruction caused by the radium went much deeper. In the other case, a discharge present on admission persisted after the application of radium to a normal-sized uterus. Six months later in another city, an hysterectomy without preliminary curettage was performed for a supposed carcinoma of the corpus. The pathologic report says that the endometrium was replaced by a yellowish substance resembling pus and that there was some pus in the right tube. This seems to be a case in which radium was introduced into an infected uterus although there never were any clinical signs of an acute inflammation.

X-ray and radium toxemia with nausea, often vomiting and prostration and occasionally evidences of damage to the kidneys does occur and should be considered in persons having renal disease.

Death following the introduction of radium into the uterus is occasionally reported. In our series two women died; one, in whom hysterectomy was contraindicated because of obesity and a very poor circulation, and with the uterus the size of a six months' pregnancy, died of pulmonary embolism eleven hours after dilatation and curettage and introduction of radium; the other a negress of thirty-eight years with chronic nephritis, uremia and a blood pressure 240/150 with terrific uterine bleeding died in coma fifteen days after dilatation and curettage under gas and oxygen anesthesia and introduction of radium.

INFLAMMATORY REACTIONS

In the literature considerable emphasis is placed upon the danger of exciting quiescent foci of infection by radium and x-ray. Many such cases^{8, 13} are reported, but the precise lesion is less often described.

A knowledge of the cause and mechanism of such inflammation is of some importance for, if it be set up by the irritating effects of electro magnetic waves upon quiescent foci, a great deal of radiotherapy would have to be abandoned. If on the other hand, it is caused essentially by bacteria introduced from the outside during the operation or liberated from the cervix or other tissues by trauma incident to the operation, steps must be taken to prevent such contamination, and if this is not possible, to substitute x-ray for radium.

Of the 434 women 5 have had a marked inflammatory reaction following dilatation and curettage and introduction of 1,200 to 1,800 mg. hr. of radium (Table II). The evidence presented by these cases would support the belief that they were operative infections. Only one of the women had had children. Only one had had any evidence of previous pelvic inflammatory disease. In every case the reaction followed the introduction of radium, in none did any signs of inflammation occur after the employment of x-ray. In three, because of exigencies present, asepsis was not perfect; in two the introduction of radium followed shortly after a curettage and in one, was accompanied by a hemorrhoidectomy.

The time of onset of the inflammation corresponds with that following uterine infection, beginning from four to ten days after the operation and lasting about three weeks or up to the time the abscess pointed or was drained. Ordinarily, residual infections lighted up by other agencies (trauma, excessive fatigue, or alcohol) reveal themselves within twenty-four hours and begin to subside in a very short time. Furthermore, the location of the process in the uterus and broad ligaments, except possibly in one case, and the rapid complete disappearance of all the induration after the abscess was drained, resemble more closely the picture of metritis and pelvic cellulitis than they do salpingitis. The greater likelihood of infection in a uterus treated by radium than in one simply curetted may be explained by the presence of the superficial slough in the uterine cavity, which furnishes an excellent portal of entry. It is of further interest to note that three women, in whom hysterectomy was attempted and abandoned because of adhesions (in one of them tuberculosis), were given x-ray treatments, soon after the wound had healed, with no sign of an inflammatory reaction. This would agree with the experience of Polak,¹⁴ and Gal¹⁵ who have employed the x-ray in the management of acute pelvic inflammatory disease.

We would conclude then that the evidence presented in these cases would point toward an operative contamination as the cause of inflammation following the introduction of radium rather than some less obvious effect of the electromagnetic waves upon either the tissues or bacteria in a residual inflammatory focus.

TABLE II. INFLAMMATION FOLLOWING INSERTION OF RADIUM

PREOPERATIVE HISTORY	INDICATION	ASEPSIS	INFLAMMATION			
			ONSET	DURATION	LOCATION	COURSE
0	Menorrhagia	Good	5th day	20 days	Uterus, broad ligaments	Pointed in rectum
0	Metrorrhagia	Good	6th day	18 days	Uterus, both broad ligaments	Pointed in rectum
Old salpingitis? Dilatation and curettage 10 days previously	Metrorrhagia	Poor	5th day	21 days	Primary unknown cul-de-sac	Pointed in rectum
Pulmonary tuberculosis	Uterus 3 months' size	Poor	4th day	10 days	Left broad ligament	Colpotomy
Dilatation and curettage 3 mo.	Menorrhagia	Hemorrhoidectomy simultaneous	9th day	11 days	Uterus, left broad ligament	Colpotomy

CHANGES IN THE TUMOR

In practically all discussions of radiotherapy for fibromyoma, the danger of degeneration is stressed, especially when the tumor is large. In this series, only one patient presented symptoms and physical signs which would indicate that degeneration had taken place. January 1, a woman aged thirty-five years with a uterus the size of a five months' pregnancy, after a diagnostic curettage, was given a sterilizing dose of x-ray. From February 2 to 6 she had a normal period. February 13, there was pain in the right side of the abdomen, maximum on the right side of the tumor over an area 5 to 6 cm. in diameter. The temperature was 101° F.; there was slight prostration and slight leucocytosis. The symptoms disappeared after a few days, but the patient was kept in bed for two weeks as a precautionary measure. She was observed and found in perfect health at the end of the year. The uterus was the size of a two months' pregnancy; no periods had occurred. This disturbance was attributed by some to the upset menstrual cycle, but the occurrence of fever and leucocytosis and the localization of the pain and tenderness, lead me to believe that there was a degeneration in a segment of the uterine mass.

DIAGNOSTIC ERRORS

In deciding the question of whether to employ radiotherapy or to perform hysterectomy for a fibromyoma or hemorrhage from the uterus, one of the most important questions is that of the possibility of overlooking important lesions in the pelvis. With x-ray treatment without diagnostic curettage both extra- and intrauterine conditions may be overlooked. With the diagnostic curettage and introduction of radium, there should be practically no undiscovered intrauterine disease. In this series, approximately 3 per cent of the patients treated have revealed unexpected intrauterine pathology such as polyp, pedunculated fibromyoma, and carcinoma of the body, which was given appropriate treatment. Even with this curettage and examination under anesthesia, there is still a possibility of overlooking pelvic lesions. Most authors report an incidence of about 50 per cent of adnexal disease associated with fibromyoma uteri operated upon. In this series there were two such cases, one a patient with sarcoma of the uterus already reported² and the other a woman who returned six months after operation with a general abdominal carcinomatosis. At the original examination vague symptoms of epigastric distress after eating, general abdominal pain, and loss of flesh and strength had been overshadowed by the uterine bleeding. The microscopic examination of a piece from the omentum suggested an ovarian origin. Whether the original growth was ovarian or gastric is not important;

the presence of these other symptoms should have demanded more extensive diagnosis and possibly an exploratory laparotomy.

THE SIZE OF THE TUMOR

There is considerable divergence among the opinions expressed concerning the effect of radiotherapy on the size of myomas. Burnam¹ for instance, reports very favorable results, while most of those advocating hysterectomy warn of the dangers of radiating masses larger than a three months' pregnancy.^{8, 13} In this series 114 women had masses larger than this (Table III), and of these, 96 were followed up. Of the tumors, three or four months in size, that is, easily palpable above the symphysis, 3 were not reduced; 1, in a woman of forty-eight years, was examined only two months after treatment and perhaps is not properly listed. By correspondence she reported no pelvic symptoms eight years later. Another was in a woman of sixty-six years who bled periodically and was extremely obese. Neither the bleeding nor the size of the uterine mass was permanently influenced by large doses of radium. The third uterus after eight years equalled in size the original mass, although at this time a carcinoma of the corpus formed the greater portion of it. The 8 tumors listed as slightly reduced showed definite reduction, but so little that, were the size of the tumor important, the treatment would have been considered a failure. Twenty tumors were so reduced in size that they ceased to be of any importance, while 49 shrank to the size of the normal uterus, although some were still slightly nodular.

TABLE III. REDUCTION IN SIZE OF UTERUS FOLLOWING RADIOTHERAPY

ORIGINAL SIZE	NONE	SLIGHT	SATISFACTORY (50-75%)	COMPLETE	NOT FOLLOWED	TOTAL
3-4 mo.	3	8	20	49	16	96
5-6 mo.	0	3	6	3	2	14
7-8 mo.	1	1	1	1	0	4
Total	4 (4.17%)	12 (12.5%)	27 (28.13%)	53 (55.2%)	18	114

Of the tumors five to six months in size, 3 were slightly, 6 satisfactorily, and 3 completely reduced. Of the very large tumors, 3 were treated by radium and x-ray because operation was contraindicated by anemia, extreme obesity, and phlebitis. The anemic patient became perfectly well and was operated upon a year later because of recurrence of bleeding. The mass in the obese woman had shrunk after two years to the size of a four months' pregnancy. The fourth patient, the only one with a free choice of treatment, had a perfect result. The mass, originally reaching the ensiform, after eighteen weeks' intensive treatment, shrank after five years to the size of a two months' pregnancy and at the end of fifteen years, to normal dimensions.

In scanning the tables it would appear that the larger masses shrank less satisfactorily than the smaller. It should be noted, however, that in our hands these are treated with radium and x-ray only when operation is contraindicated. We prefer to operate on them because of the greater likelihood of a mistake in diagnosis and of there being a degeneration in one of the masses. It is difficult to say why one mass should shrink more rapidly than another. Clinically it has been observed that the softer masses shrink much more rapidly than those of a very hard consistency and it is inferred that, in these, the smooth muscle has been replaced by hyaline or possibly calcified tissues which will be little reduced in volume. The rate of shrinkage is equally variable. Some of the masses have disappeared in two months, others in six months; most of them became stationary at the end of one or two years; a few regularly observed have continued to shrink for five years, and one uterus apparently continued to diminish in size after this.

These observations would confirm the general opinion that large tumors are not well reduced by ordinary doses of radiotherapy, but that, where the size of the tumor is not the main indication for treatment, any increase in size can be definitely prevented, and an almost certain promise of a reduction in size can be given. Moreover, the results are good enough to demand that hysterectomy mortality should be kept down to a percentage representing operative accidents, such as pulmonary embolism and pneumonia, and that the postoperative morbidity and interference with the earning capacity be kept down to a minimum. Where the unfavorable condition of the patient or the presence of nonemergent local complications, such as adhesions which present great technical difficulties, promise a high mortality, the operation should, if possible, give way to radiotherapy; and when such local conditions are found unexpectedly during an operation, the surgeon should not hesitate to withdraw and use x-ray at a later time. The treatment of myoma is rarely an emergency, and in each case should be designed for necessary relief with a minimum of harm. It should not be determined by the extreme considerations present in the treatment of a disease like carcinoma.

CARCINOMA OF THE UTERUS

The likelihood of a carcinoma growing in a uterus is believed by many to be increased by the irritating effects of a therapeutic dose of radium and by others to be diminished by the very same factor. Whether or not the radiotherapeutic menopause influences the incidence of carcinoma of the uterus one way or another could best be established by a mass of direct observations showing the occurrence of carcinoma in uteri so treated, and comparing this with the incidence among women in general. This is at present impossible because the

scattered reports of carcinoma are mostly of individual cases, rarely covering any extended period of observation, and are usually made by persons other than those who gave the initial treatment. The general incidence of carcinoma of the body of the uterus is 0.5 per cent; of carcinoma of the cervix 1.9 per cent.¹⁰ The incidence of carcinoma with fibromyoma is difficult to determine because many reporters, as for instance Cullen,³ only consider fibroids which have a clinical significance. He reports an incidence of 1.7 per cent of carcinoma of the body and 1.3 per cent of carcinoma of the cervix. Viewed from another angle, Norris and Vogt¹² found myomas in 20.8 per cent of cases of carcinoma of the body, while Olshausen reports 10 per cent. Fibromyoma of the uterus occurs in nearly 50 per cent and in nearly all unmarried middle-aged women.¹⁸ Carcinoma of the cervix in the pathologic collection of a gynecologic service¹¹ occurs about five times as frequently as carcinoma of the body. From these figures no very definite percentages can be established, but they indicate that carcinoma of the uterus might be found in 2.4 per cent of women in general and in 3 per cent of cases of fibromyomas which give symptoms.

In discussing the results of radiotherapy, Ford⁴ reports 6 cases of carcinoma developing within one year after the application of radium to myomatous uteri, 2 after two years, and one after three years. In the cases here reported 2 cases of adenocarcinoma of the body occurred, once in a uterus originally the size of a four months' pregnancy, eight years after treatment when the uterus was unchanged in size, and once after four years in a uterus originally of normal size but containing tiny seeds of myoma and a polyp. Two cases of carcinoma of the cervix of cylindrical cell type occurred, one after eight years in a uterus originally the size of a five months' pregnancy but now the size of six weeks' pregnancy; the other after six years, in a uterus originally of normal size and now of senile dimensions. One typical squamous cell epithelioma appeared after seven years in a uterus originally the size of a four months' pregnancy. These 5 cases of carcinoma of the uterus occurred in 393 women followed for an average of about seven years, giving an incidence of 1.28 per cent for that period.

ADENOMYOMA

Adenomyoma was discovered once in a uterus treated seven years previously. Had there not been a complete autopsy of a woman dying of myelitis caused by syphilis of a vertebra, it would not have been detected and yet, small as it was (1 cm. in diameter), the microscopic picture was characteristic. One expects endometrial tissue to atrophy after the menopause, but in this case the glands were well formed, the epithelium of good height with well stained nuclei.

DISEASES OF THE ADNEXA

In the reports of the lesions found at operation for fibromyoma of the uterus, there are noted diseases of the adnexa in about 50 per cent of the cases.⁸ In this series, the only case of disease of the fallopian tube occurred in the case already mentioned among those having sloughs. Of diseases of the ovary, there have been 4. One, a woman of forty-nine years with a normal uterus and metrorrhagia, was given 1,200 mg. hr. of radium resulting in an amenorrhea, with no symptoms except continuation of hypertension and chronic heart disease until nine years later when there was slight uterine bleeding. The curettage was negative. Several masses were felt in the pelvis, one in the rectovaginal septum, biopsy of which showed carcinoma. A month later the patient died with an acute cardiac decompensation. Autopsy showed carcinoma of the ovary with generalized metastasis. Two true cystadenomas, one containing areas which looked suspicious of carcinoma and one unclassified cyst with a lining of flat cells occurred after four years, five years, and seven years respectively.

Aside from these tumors, there were no enlarged ovaries. The small number of cystic conditions in the ovaries may be explained in part by the effect of the rays on the follicular apparatus. The same atrophy of the follicles which determines the sterility may, by eliminating these cells, prevent subsequent follicular changes which would go on to form cysts. This effect has been apparent in four cases with definite cystic ovaries which have been treated by radium and x-ray with disappearance of the ovarian enlargement. These previously had been examined during a laparotomy, three times for resection of cystic ovaries for dysmenorrhea and once for hysterectomy. In this case, the ovary, left in on general principles, enlarged to about 8 to 10 cm. in diameter within six months. X-ray was given because the patient absolutely refused operation.

LESIONS IN THE REST OF THE BODY

In 119 patients there have occurred the following diseases: vulvar abscess, 1; earuncle, 1; chronic vaginitis, 1; cervicitis, 1; cystitis, 2; cerebral embolism, 1; cerebral hemorrhage, 3; auricular fibrillation, 1; hypertension, 4; arteriosclerosis, 1; chronic cardiac valvular disease, 1; Graves's disease, 1; neurosis, 6; melancholia, 1; herpes zoster, 1; endothelioma of lung, 1; sarcoma of iliac bone, 1; carcinoma of breast, 2; lipoma, 1; carcinoma of rectum, 1; benign rectal tumor, 1; pneumonia, 2; pulmonary tuberculosis, 3; asthma, 1; undiagnosed abdominal pain, 1; digestive disturbances, 4; hyperchlorhydria, 1; hemorrhoids, 1; pruritus ani, 1; diverticulum of sigmoid, 1; diverticulum of duodenum, 1; duodenal ulcer, 1; appendicitis, 1; cholecystitis, 7; arthritis, 41; diabetes, 3; nephritis, 6; nephrolithiasis, 1; ureteral calculus, 1; myelocytic leucemia, 1; syphilis of vertebra, 1; bursitis,

3; alopecia areata, 1; sacroiliac disease, 1; and hallux valgus, 1. Of these conditions none has occurred with enough frequency to demand attention except arthritic symptoms. These are being studied and will be discussed later.

PREGNANCY

Three women became pregnant and have been already reported.¹⁹

SUMMARY

In all of these diseases, whether of the reproductive organs or in the rest of the body, the incidence seems lower than the normal rate. The only explanation is that at the time of the original admission an effort was made to make a thorough investigation, and if anything was found which would suggest adnexal disease or if suspicious conditions of the uterus were found at the exploratory curettage, other measures were employed. Diseases of other organs were given appropriate treatment. In 3 per cent of the cases in which a diagnostic curettage was performed prior to the planned administration of radium, there have unexpectedly been found conditions (carcinoma of the body of the uterus, epithelioma of the cervix, pedunculated intrauterine myomas, polyp) which have caused a change in the method of treatment. If they had not been so examined, they would have added to the list of local diseases which appeared later.

Aside from the diseases of the genital organs there have been referred for treatment of a myoma, patients whose symptoms were found to be caused by gall bladder disease, gastric ulcer, gumma of the small intestine, carcinoma of the rectum, diverticulitis of the sigmoid, and tuberculosis of the kidney. These conditions are cited to bring out the point that errors in diagnosis with fibromyoma are not limited to diseases of the pelvis. The exploratory suprapubic incision would have helped little toward their relief.

From the evidence here presented, it would appear that the use of x-ray and radium for the treatment of benign uterine conditions is relatively harmless. Of the local conditions attributable to its uses, there occurred in one case a slough, in another a slight degeneration. All the other accidents followed the operation of dilatation and curettage and may be attributed to it, the rôle of the radium being doubtful. There was one death from embolism and one from uremia. Five patients had postoperative inflammation, all but one being fairly definitely due to operative contamination. The effect of this treatment on the size of the uterine myomas varied. Growth was stopped in all patients treated, reduction to a satisfactory degree has occurred in 83 per cent, and there has been complete reduction of the mass to the size of a normal uterus in 55.2 per cent. The treatment was less

TABLE IV. TUMORS OF REPRODUCTIVE ORGANS

ORIGINAL CONDITION			SUBSEQUENT DISEASE				
PELVIC EXAMINATION ANTE-OPERATIVE	TREATMENT	DISEASE	ONSET POST-OPERATIVE	LOCAL CONDITION	TREATMENT	RESULT	FOLLOWED
Uterus size 4 mo. Nodular cavity Size 6 wk. Nodular endometrium. Polyp.	Dilatation and curettage; radium Dilatation and curettage; radium	Adenocarcinoma of uterus Adenocarcinoma of uterus	8 yr. 3 wk. 4 yr.	bleeding. Extensive carcinoma Uterus normal size. Small carcinomatous bits in cavity. At hysterectomy no carcinoma found	Excision, x-ray Dilatation and curettage; radium excision	Recurrence Perfect health	2 yr. 1 yr.
Size 5 mo. Clarke test for carcinoma Normal size. Cavity smooth Curettings grossly normal	X-ray Dilatation and curettage	Adenocarcinoma of cervix Carcinoma of cervical canal	8 yr. 6 yr.	Uterus size 6 wk. Uterus small. Cylindrical cell carcinoma of cervix	Radium Radium	Died Well	2 yr. 3 yr.
Cervix granular Size 4 mo. Nodular. Cervix hard, lacerated	Dilatation and curettage; radium Dilatation and curettage; radium	Epithelioma of cervix Carcinoma of ovary	7 yr. 10 yr.	Uterus normal size. Squamous cell epithelioma of cervix General abdominal carcinomatosis	Radium Biopsy	Died Died; autopsy	6 mo.
Normal Size 3 mo. Mass felt posteriorly. Clarke test for carcinoma	X-ray	Cyst of ovary	7 yr.	10 cm. unilocular cyst. Uterus slightly enlarged. Adenoma. Transverse myelitis	None	Died of myelitis; autopsy	1 yr.
Size 5 mo. Fundus enlarged, extending halfway to umbilicus Normal size, trifle rounded, smooth	Dilatation and curettage; radium Dilatation and curettage; radium	Cystadenoma of ovary Cystadenoma of ovary	4 yr. 5 yr.	Cyst 30 cm. Uterus 1½ mo. Cyst 27 cm. Uterus small. atrophic	Excision Left salpingo-oophorectomy	Well Well	4 yr. 2 mo.

of the Uterus: There has just come in the report of a patient operated upon for a pedunculated intrauterine tumor, diagnosed microscopically as adenocarcinoma occurring in a woman who received, twelve years previously, 1,200 mg. hr. radium in a normal uterus. The details of this case to be reported later. Six cases of sarcoma of the uterus following radiotherapy have been reported. (2, 6, 7, 18, 19)

satisfactory in the large masses but good enough to demand that operative mortality and morbidity from hysterectomy should be kept down to an irreducible minimum.

Perfection in diagnosis, because of the seriousness of the conditions likely to be overlooked, should above all things be the goal of the physician who would treat these benign conditions. With this object in view, one must decide how far he should go in making the diagnosis by exploration. Certainly the diagnostic curettage is made almost imperative by the large percentage of intrauterine lesions so discovered. Exception to this rule involves great responsibility and possibly even liability. The exploratory laparotomy on the other hand is much more serious and should be undertaken only for clear-cut reasons (size of tumor, indefiniteness of outline, involvement in or association with masses which seem to be extrauterine).

Usually at the time of exploration there will be removed whatever seems necessary. This brings up the question of prophylactic excisions. Is it ever proper to treat by conservative means uterine bleeding or myoma; should not, in all, the uterus and probably other organs be removed? The evidence (Table IV) from these cases would indicate that the incidence of diseases in the organs of reproduction after treatment by x-ray and radium is a little less than in women in general, so that the question of prophylactic excision becomes one of interest to all women and not especially to this group. The occurrence of uterine bleeding and discovery of a small myoma does not make one a candidate for promiscuous prophylactic excision; with the bleeding stopped and the uterus made smaller by radium or x-ray, she has the same chance for health as the woman without these conditions. Certainly there is no information which would require wholesale prophylactic excision of the sex organs. We must continue to rely on routine periodic examinations and attack conditions in their incipiency as they arise.

Finally, with a multiplicity of therapeutic measures available for the treatment of uterine bleeding and myomas, the patient must be protected from the danger usually attendant upon such a situation. With 11 possible variations in treatment (simple observation, curettage, myomectomy, supravaginal and complete hysterectomy with or without removal of the tubes, ovaries and cervix, double oophorectomy, partial and sterilizing doses of radium and x-ray, and x-ray of the uterus with protection of the ovaries), she must be under the control of one guiding individual or group who will not allow her to be lost among the various therapeutic specialists, nor to suffer from the competitive spirit unfortunately still occasionally evident. She will be best cared for by a gynecologic staff who practice all methods of therapy, operative, radiotherapeutic, or any other.

CONCLUSIONS

A study of 434 women of whom 393 were followed from one to seventeen years with an average follow-up period of seven years shows that:

1. X-ray and radium furnish a safe method for the treatment of fibromyomas and uterine bleeding.
2. The most important factor in the radiotherapeutic treatment of these conditions is accurate diagnosis. When this is doubtful, whether because of lack of diagnostic equipment on the one hand, or because of the inherent difficulties presented, exploration should be performed.
3. Degeneration in a treated myoma is rare.
4. The incidence of tumors of the uterus (sarcoma, carcinoma, epithelioma) is unaffected by the artificial menopause.
5. The incidence of tumors of the ovary is uninfluenced by the method.
6. Cystic changes in the treated ovary occur with much less frequency than in the average woman of the same age.
7. Of the cases followed, a reduction in the size of the fibromyoma has occurred in 96 per cent; in 55.2 per cent, a complete disappearance; in 28.3 per cent, a reduction of 50 or more per cent; in 12.5 per cent, a definite but unimportant reduction. The larger tumors have responded less satisfactorily than the smaller.
8. The reduction in the size of the masses has been satisfactory enough to demand that operative mortality and morbidity from hysterectomy be lowered to an irreducible minimum.
9. The inflammatory reactions following dilatation and curettage and the introduction of radium seem to be due more to the operative procedure rather than to the effect of the electromagnetic waves. No case of acute inflammation followed the use of x-ray.

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THE ELLIOTT TREATMENT

A NEW METHOD OF APPLYING VAGINAL HEAT*

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MANY discoveries of modern medicine are but rediscoveries which have been erased from the memories and records of men. Even as far back as 450 B.C., Hippocrates, who first systematically considered the diseases of women, recorded fundamental principles which still stand in methods of treatment today. Of these, we shall consider the vaginal injection or douche, which he prescribed in the hygiene of the genitalia and for relief of pelvic pain.

Forgotten for a time, the douche was rediscovered 1000 years later, and written about by Galen and Celeus.

From their time until 1683, there was little or no progress made in the diseases of women, chiefly because of the Moslem religion, which forbade visual and digital examination of the female genitalia by male physicians. Gynecology became a lost art, necessitating, once more, physicians of this period to start anew. The value of applying heat to the vagina was quickly rediscovered. German physicians heated shot and poured it into the vagina in order to maintain prolonged heat and greater distention than could be obtained by the injection of hot water alone.

In the early nineteenth century, intrauterine douching displaced the intravaginal, until Emmett condemned the use of intrauterine douches and once again advocated the hot vaginal douche in the treatment of pelvic inflammatory diseases, by which procedure he felt he saved many of his patients from operation. He stressed attention to detail and attributed his successes to this factor.

In 1924, Gellhorn obtained greater intravaginal heat by recognizing that the vaginal mucosa was less sensitive to heat than was the vulva and perineum. He applied a prolonged vaginal douche, using 2 gallons of water, at a temperature of 115° to 120° F., the woman sitting in a bathtub, the vulva and perineum being protected with vaseline. To this method, Gellhorn attributed good results in pelvic inflammatory disease, subinvolution and pelvic pain, many cases being cured without operation.

Dr. Charles Robert Elliott also observed this lesser sensitivity of the vagina to heat. He devised what we believe to be the best method of application of heat to date; namely, a distensible vaginal bag through which water is introduced and maintained at any desired temperature and pressure. By this method it is possible to introduce

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a bag containing water at a temperature of 115° to 120° F., increasing the heat $\frac{3}{4}$ of a degree per minute until a temperature of 130° is reached. This is maintained for the remainder of the hour and constitutes one treatment. The bag is maintained at quite a large size as is shown in Figs. 1 and 2.

The heat is distributed equally in all directions. Thermometers inserted in the urethra, bladder, and rectum of a patient having a nor-

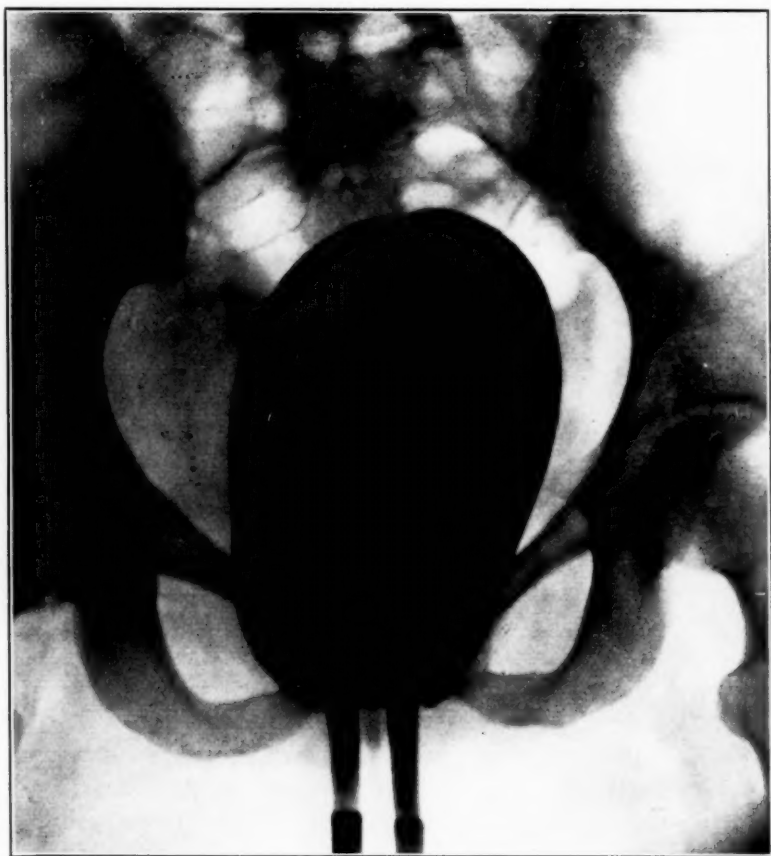


Fig. 1.—Showing bag in position in vagina.

mal mouth temperature, read as follows: in the urethral meatus 104° , in the bladder proper 104.1° , anterior rectal wall 106° , posterior rectal wall 104° . The rise in mouth temperature after one hour's treatment varies from no rise to $\frac{1}{10}$ of a degree increase. Speculum examination after a treatment shows that the hyperemia caused a marked increase in the cervical and vaginal secretions. After two treatments, the cervix is softened and actually becomes shorter and broader, thereby causing a widening and shortening of the cervical glands.

In a pelvic inflammatory case, mobility of the uterus increases with continued treatment, tenderness decreases, and the uterus and adnexa can more easily be outlined, due to absorption of the exudate. White blood counts taken immediately before and after the treatment in 236 instances showed a leucocytic increase of 17.1 per cent in 207, a 9 per cent decrease in 28, and one had no change at all.

INDICATIONS FOR ELLIOTT TREATMENT

In the first 150 consecutive cases of pelvic inflammatory disease treated by the Elliott apparatus, we used the treatment in all types



Fig. 2.—Lateral view, showing possible vaginal distention.

and degrees of pelvic pathology, acute and chronic. All patients treated were sick enough to necessitate hospitalization. This treatment was at first used in cases of cellulitis and the so-called frozen pelvis. We then tried it in pelvic abscesses before fluctuation thinking that it would hasten the formation of pus. To our astonishment, however, resolution took place instead. As we became more familiar with the action of this type of heat, we did not hesitate to treat acute salpingitis with or without pelvic peritonitis. (Table I.)

TABLE I. COMPARISON OF PATHOLOGIC LESIONS ON DISCHARGE

ACUTE SALPINGITIS			CHRONIC SALPINGITIS	
FORMER TREATMENT BELLEVUE 1926-1927	ELLIOTT TREATMENT BELLEVUE 1929-1930	DEGREE OF DIMINISHED PATHOLOGY	FORMER TREATMENT BELLEVUE 1926-1927	ELLIOTT TREATMENT BELLEVUE 1929-1930
None	None	No pathology palpable	None	6.8%
12%	51%	Marked improvement	10%	34.5%
18%	32%	Considerable improvement	20%	48.2%
20%	13%	Slight improvement	30%	10.5%
50%	4%	No improvement	40%	None
PELVIC CELLULITIS			PELVIC ABSCESS	
None	None	No pathology palpable	None	3.4%
None	28.5%	Marked improvement	None	34.5%
None	64.2%	Considerable improvement	10%	55.3%
60%	7.3%	Slight improvement	30%	3.4%
40%	None	No improvement	60%	3.4%

This series was begun in November, 1929, and ended in August, 1930. Our follow-up has been fairly complete for a city institution, the patients returning for frequent reexamination. We have given 5,233 treatments to date in about 500 cases and have had only one severe burn which was the result of personal negligence on the part of the nurse who allowed the temperature to reach over 145° . In this case the treatment was not discontinued, but given daily at a temperature of 124° ; the white slough was soon replaced with new mucosa, without any untoward effect. Eleven other cases received slight burns about the introitus, and eight had mild burns in the lateral fornices. These we attribute to poor distention of the bag.

The Elliott treatments are given in conjunction with rest in bed, bowel hygiene, and sedatives as needed. In the cases being reported, modified Fowler's position of the bed was maintained if the temperature of the patient was high.

Our former treatment for pelvic inflammations, consisted of rest in bed, modified Fowler's position, bowel hygiene, sedatives, ice bag to the abdomen, and milk injections or diathermy if a low-grade temperature persisted. No local treatments were carried out. Our previous experience was that a patient with pelvic inflammatory disease under the above régime, was usually discharged symptom and temperature free, but not organism nor pathology free. By the use of the Elliott treatment, we believe we are directing our efforts more toward a "cure" by causing absorption of the pathologic exudate and making the patient organism-free, thereby preventing future exacerbations.

DIMINUTION IN THE PATHOLOGIC LESIONS

To evaluate the Elliott treatment, we have selected from the Bellevue Hospital record room, as our control series, the charts of non-operative pelvic inflammatory cases from our Service, during 1926-

27 and compared the admission pathologic findings with those at the time of discharge. Likewise, the admission and discharge findings of all the Elliott cases were compared, estimating the degree of improvement from four plus to one plus, that is, from no residual pathology to no improvement of pathology. The results as thus tabulated show a more rapid absorption of the pelvic exudates with the Elliott treatment. This fact we believe to be of prime importance. (Table II.)

It is interesting to report that all types of pelvic inflammations of infections responded equally well. It is our opinion, however, that the earlier the acute inflammations are treated by this method, the better the results will be. We believe that the continued action of the heat stimulates the circulation in the pelvis so that the local congestion is relieved before there is an exudate formed in the surrounding tissues causing a cellulitis. The latter forecasts a much longer illness.

In acute salpingitis there was rapid relief of symptoms, with decreasing pathology and seldom were there any reactions following treatments.

Under salpingitis we have also included tuboovarian abscesses, varying from moderate size to those that fill the entire lower abdomen. Of the latter, we had eight such cases, where the mass extended more than halfway to the umbilicus. One case responded so vigorously and the mass sank down so low into the pelvis, that the bag could not be introduced into the vagina, necessitating culdesac drainage. All the other cases escaped operation and were discharged with little or no pelvic pathology.

We treated 33 cases of pelvic abscess, ten of these only after colpotomy had been performed. The Elliott treatment was started on the third day postoperative at which time the vaginal packing was wholly or partially removed. The patients were allowed out of bed as soon as the temperature touched normal to afford better dependent drainage. The pressure of the bag, together with the heat, hastened the expulsion of the pus and the healing of the sinuses.

Of the remaining 23 cases of pelvic abscess in which treatment was continued despite fluctuation, only three cases required culdesac drainage, because the temperature and toxic symptoms were running fairly high. The other twenty cases needed no drainage, since resolution took place instead.

GONORRHEA

Gonorrhea of the female genital tract has been resistant to former treatments mainly because of the many glandular crypts in which the organisms are safely harbored. The three important points of latency are, the cervix, urethra, and Bartholin's glands. Since gonorrhea is char-

TABLE II. ONE HUNDRED FIFTY CONSECUTIVE CASES TREATED WITH THE ELLIOTT APPARATUS AT BELLEVUE HOSPITAL, NEW YORK CITY

ACUTE SALPINGITIS, CAUSE, GONORRHEA, 58 CASES		NUMBER OF PATIENTS	AVERAGE NO. DAYS IN HOSPITAL BEFORE E. T. COMMENCED	AVERAGE NO. DAYS IN HOSPITAL FROM TIME OF FIRST E. T. UNTIL DISCHARGE	AVERAGE NUMBER E. T.	AVERAGE NO. DAYS IN HOSPITAL BEFORE AND DURING E. T.
1. Salpingitis or tuboovarian abscess		32	8.2	10.8	8.5	19.0
2. With pelvic peritonitis		9	7.5	22.3	19.8	29.8
3. With pelvic parametritis or cellulitis and peritonitis		7	12.9	14.7	11.1	27.6
4. With pelvic abscess		10	8.0	20.9	13.7	28.9
A. Pelvic abscess, postcolpotomy before treatment		2				
B. Pelvic abscess treated, requiring later postcolpotomy		3				
C. Pelvic abscess treated, postcolpotomy not necessary		5				
A-1. Elliott treatment ordered to prepare patients for laparotomy. Elliott treatment given and laparotomy not performed		4				
B-1. Warned to watch for ectopic		4				
C-1. Tuboovarian masses extending $\frac{1}{2}$ way or more to umbilicus		4				
ACUTE SALPINGITIS, CAUSE, ABORTION, 20 CASES						
1. Salpingitis or tuboovarian abscess		8	9.2	10.3	7.3	19.5
2. With pelvic peritonitis		3	2.7	16.0	13.7	18.7
3. With pelvic parametritis or cellulitis and peritonitis		4	5.0	23.5	19.8	28.5
4. With sepsis		2	14.0	18.0	15.0	32.0
5. With pelvic abscess		3	8.3	30.0	26.0	38.3
A. Pelvic abscess treated, requiring no postcolpotomy		2				
B. Pelvic abscess, postcolpotomy before treatment		1				
A-1. Elliott treatment ordered to prepare patients for laparotomy. Elliott treatment given and laparotomy not performed		1				

TABLE II—CONT'D

CHRONIC SALPINGITIS, CAUSE, GONORRHEA, 58 CASES		NUMBER OF PATIENTS	AVERAGE NO. DAYS IN HOSPITAL BEFORE E.T. COMMENCED	AVERAGE NO. DAYS IN HOSPITAL FROM TIME OF FIRST E.T. UNTIL DISCHARGE	AVERAGE NUMBER E. T.	AVERAGE NO. DAYS IN HOSPITAL BEFORE AND DURING E. T.
1. Salpingitis or tuboovarian abscess		37	8.9	11.5	7.5	20.4
2. Pelvic cellulitis or parametritis		5	8.2	12.8	12.6	21.0
3. With pelvic abscess		16	13.6	14.8	11.4	28.4
A. Pelvic abscess, postcolpotomy before treatment		5				
B. Pelvic abscess treated, requiring later postcolpotomy		0				
C. Pelvic abscess treated, postcolpotomy not necessary		11				
A-1. Tuboovarian masses extending $\frac{1}{2}$ way or more to umbilicus						
B-1. Parametritis causing stony hard masses						
C-1. G. C. arthritis						
D-1. Elliott treatment ordered to prepare patients for laparotomy. Elliott treatment given and laparotomy not performed		16				
E-1. Warned to watch for ectopic		2				
F-1. Elliott later laparotomy		1				
CHRONIC SALPINGITIS, CAUSE, ABORTION, 14 CASES						
1. Salpingitis or tuboovarian abscess		6	7.0	6.5	4.8	13.5
2. With pelvic cellulitis or parametritis		4	26.5	5.8	5.5	32.3
3. With pelvic abscess		4	8.0	23.7	15.5	31.7
A. Pelvic abscess, postcolpotomy before treatment		2				
B. Pelvic abscess treated, postcolpotomy not necessary		2				
A-1. Tuboovarian masses extending $\frac{1}{2}$ way or more to umbilicus						
B-1. Parametritis causing stony hard masses						
C-1. Elliott treatment ordered to prepare patients for laparotomy. Elliott treatment given and laparotomy not performed		1				
D-1. Cases later becoming pregnant		2				
E-1. Warned to watch for ectopic		1				

acterized by exacerbations of salpingitis due to extension of infection from these foci, it behooves us to attack the organism from below, before attempting surgical intervention from above.

The severity of any disease depends on the virulence of the affecting organism and the resistance of the tissues attacked. Gonococci are only virulent under ideal conditions, for example, they will grow only on special nutrient agar, are killed by weak disinfectant solutions and by desiccation in thin layers. At its optimum temperature for growth and proper nutrition, the gonococcus however will live indefinitely. At a temperature of 106° it is killed in a few hours, and at 122° in ten minutes.

Therefore, in order to kill gonococci, the temperature must be raised sufficiently and its habitat, the glands, made as poor a culture medium as possible. Nature attempts to do this very thing, by an initial rise of body temperature and an increased glandular secretion, which persists until the attack is controlled.

The first factor, temperature, is taken care of by the Elliott apparatus which maintains a temperature of 130° in the vagina. The heat is radiated in all directions and we find the following temperatures are maintained in the pelvis of a patient with a normal mouth temperature, in the cervix proper 112° , on the anterior rectal wall 106° , posterior rectal wall 104.2° , in the urethral meatus 104° , and in the bladder proper 104.2° . All these temperatures are correspondingly higher in proportion to the original body temperature which rises only 0.4 of a degree with this treatment.

The second factor, the habitat of the gonococci is also altered by the Elliott treatment, which causes a change in the contour and activity of the glands. After only two treatments, one can notice an excessive secretion both from the vaginal mucosa and the cervix. The parts become soft, the cervix becomes shorter and broader, and the cervical canal wider. One may assume, therefore, the glands likewise become shorter and broader. At the same time that this change in contour takes place, there is a pouring out of the glandular substance which harbors the gonococci.

The same principles apply to the urethral and Skene's glands. We have noticed, however, that there are Skene's ducts which, because of their anatomic position and mucous tabs, do not have proper drainage, and as our results show, this type will not become organism-free as soon as other cases. In our experience a chronic Bartholinitis is not a common point of latency.

It is the experience of most clinicians that the gonococci are easily found in smears taken from the urethra and cervix in the acute stage of the infection, but the organisms are hard to find in the chronic stage. How then can we tell when a patient is cured? The comple-

ment-fixation test which has great promise, lacks a standard antigen and gonococci cultures require special laboratory facilities and technicians.

On the advice of Dr. Anna Williams of the New York City Research Laboratories, we obtained a trained technician who made "spreads" (not smears) from the cervix and urethra. The wire loop is spread across the slide only once and not smeared across several times. This gives a clearer microscopic picture with the leucocytes unbroken and the organism remaining intracellular. According to the microscopic picture of a well prepared spread, the cases are divided into four groups: (1) positive, (2) suspicious, (3) doubtful, or (4) negative, depending on the presence of morphologically typical gram-negative diplococci, the percentage of polymorphonuclear leucocytes, and the position of the organism.

Spreads are taken daily before treatment and the case is dismissed as tentatively cured if there were five negatives and one negative after a provocative test of silver nitrate. We found it essential to keep the patient in the hospital for this period of time to exclude the possibility of reinfection from her consort. She was then allowed home and spreads were repeated for the first three successive days following each menstrual period for three months. If a positive spread appeared after the first menstrual period, the process was again repeated, giving treatment daily until negatives appeared.

Following this procedure we have discharged 31 cases tentatively cured, requiring an average of 20.5 treatments for the urethra and 18.3 treatments for the cervix to obtain 5 consecutive negative spreads and one negative after a provocative test. No other treatment was given with the exception of a daily cleansing douche. These patients have all returned after menstrual periods for check-up spreads and were found to be negative, some as long as five months later.

In four cases, urethral spreads remained positive after 26 or more treatments. Cauterization of Skene's ducts with the nasal cautery was quickly followed by cure.

NUMBER OF DAYS IN HOSPITAL

Since the Elliott cases were so materially improved, one must know how long this took in comparison with our control series. Table III

TABLE III. AVERAGE NUMBER OF DAYS IN HOSPITAL

TYPE OF PATHOLOGY	FORMER TREAT- MENT BELLEVUE 1926-1927	ELLIOTT TREATMENT	
		BEFORE AND DURING TREATMENT BELLEVUE 1929-1930	FROM FIRST TREAT- MENT UNTIL DIS- CHARGED BELLEVUE 1929-1930
Acute salpingitis	27.2	21.3	13.2
Chronic salpingitis	24.3	19.4	10.8
Pelvic cellulitis	41.0	27.1	14.2
Pelvic abscess	31.8	29.9	19.1

illustrates that the time of hospitalization is never more in those cases having Elliott treatment. Although the pelvic abscess series averages the same number of days, only 13 per cent in the Elliott series required posterior colpotomy compared to 75 per cent under our former treatment.

CONCLUSIONS

1. By means of the Elliott apparatus a consistently uniform temperature of 130° can be maintained for any length of time against a large area of distended vagina, cervix, adjacent parametrium, and pelvic organs.

2. This application of heat causes a marked increase in pelvic circulation.

3. In our experience, it is an excellent treatment for gonorrhea because a temperature lethal to the gonococci can be easily maintained for an indefinite period of time, thereby clearing up the latent foci of infection which heretofore were so difficult to reach.

4. In cases of salpingitis, pelvic cellulitis, tuboovarian, or pelvic abscess, the marked increase in pelvic circulation causes a more rapid resolution in a shorter period of time than with any of our previous methods of treatment.

59 EAST FIFTY-FOURTH STREET.

Ottow, B.: Nature, Diagnosis, and Therapy of Aberrant Endometrial Growths of the Female Urinary Bladder. *Zentralbl. f. Gynak.* 53: 3330, 1929.

Two of the author's own cases, and 14 more from the literature are reported in considerable detail. Ages of the 16 cases varied from twenty-two to forty-eight years, but predilection lies in the decade from thirty-five to forty-five. Symptoms are: pain and smarting on urination in relation to menses with freedom from symptoms during the intermenstrual period. Occasionally there is pyuria, pollakuria, hematuria, and dysmenorrhea. Symptoms usually begin one or two days before the menstrual flow is established, and last about a week after its cessation. The course of the disease is chronic over a period of several years, with a gradual increase in severity of symptoms with each menstruation.

Diagnosis is based on three points: history, palpation of a tumor mass, or an ill-defined "resistance," and cystoscopic examination. The condition has to be differentiated from fibroma and myoma, carcinoma, chorionepithelioma, cavernous angioma, and varicosities. Clinically, the exact differentiation must depend on the cyclic variation with relation to menstruation of the cystoscopic appearance of the tumor.

Therapy cannot be prescribed didactically, but depends on the age of the patient, localization of the tumor with respect to other structures, its appearance, and its rapidity of growth. Total extirpation of the tumor, and operative and radiation castration are the possibilities.

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THE SURGICAL INDICATION IN ECLAMPSIA*

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THE question of the management of eclampsia is one upon which there still exists a wide difference of opinion. In some clinics every effort is used to remove the products of gestation as speedily as is possible, while in other clinics, of equal standing, the fetus is almost or entirely ignored as a factor in the disease. Not only is this true but I have seen the trend of popular therapeutics as related to eclampsia, swing all the way from accouchement forcé to a fixed rule of inactivity, at least in so far as the fetus is concerned. As is usual in instances of this kind, there is perhaps a midposition that is more logical than either extreme. It is with this in mind that I have reviewed approximately 800 consecutive deliveries done during the past four years. From this number 12 cases may be classified as preeclamptic and 8 as actually eclamptic. I appreciate the fact that statistical studies should be based only upon large series of cases. The cases under consideration however have been carefully studied and when viewed in conjunction with our present understanding of eclampsia, they may be used as a basis upon which a mode of procedure may be suggested.

The term eclampsia has been applied for years to a more or less definite acute toxemia of pregnancy, usually manifesting itself in the latter half of the gestational period. The most characteristic manifestation of eclampsia is convulsions, and the term is naturally associated with their occurrence. Closely allied to the actual eclamptic state is preeclampsia, which from every viewpoint, is eclampsia minus its most characteristic phenomena, convulsions. In this consideration of eclampsia, I will include preeclampsia, omitting all of the so-called nephritic toxemias and that type of case so well characterized by Stander¹ as low reserve kidney. It is not my intention to enter into a lengthy consideration of the various theories as to the etiology of eclampsia, nor to consider too much in detail the various laboratory findings, either histologic or biochemical, that are associated with eclampsia. A brief consideration of these topics is, however, necessary for a rational understanding of the management of the eclamptic patient.

As to etiology, no one of the hypothesis thus far suggested is entirely satisfactory. Zweifel³ has well termed eclampsia the disease of theories. Eclampsia does, however, seem to be in some way dependent upon the metabolism of the fetus, and also definitely related to maternal protein metabolism and intestinal hygiene.

*Read before the Brooklyn Gynecological Society, November 7, 1930.

The most characteristic histologic finding in eclampsia is the so-called hepatic lesion; a perilobular hemorrhage and liver cell necrosis. The work of Dieckmann⁴ of St. Louis, on the experimental production of this lesion and its relation to therapy is a recent advance of importance. There are associated renal changes, but the characteristic lesion of eclampsia is hepatic, although, even this is not a constant accompaniment.

From a clinical standpoint, the biochemical changes associated with eclampsia, are limited to a few abnormalities in the urine and blood. The urine usually shows large amounts of albumin, with hyaline and granular casts; these findings being associated with a definite arterial hypertension. The blood chemistry changes of note, are usually limited to a uric acid increase of from 5 to 9 mg. and a CO₂ combining power decrease to below 35 volumes per cent. The blood-sugar findings are not definite, although Titus and Dodds⁵ have demonstrated, what they term "a relative hypoglycemia" immediately preceding the convulsive seizures. They state that the general trend of the sugar content is downward; although for years it has been assumed that eclampsia is usually associated with a hyperglycemia. When the blood chemistry presents evidence of nitrogen retention, it is produced either by a primary renal condition or a renal condition directly resulting from the eclamptic toxemia.

Bearing in mind these facts: namely, that eclampsia is a definite toxemia, characterized chiefly by an acidosis and a relative hypoglycemia, the following course of treatment has been adopted.

The preeclamptic patient is subjected to cesarean section, under local or spinal anesthesia. This course is not to be confused with the various methods of accouchement forcé in vogue in the management of eclampsia some years ago. The suspected preeclamptic patient is hospitalized and is there carefully studied over a period of time varying from several days to a week or two; during this period of study dietetic measures are in force, intestinal hygiene is maintained and the patient is kept at rest by the liberal use of opium. If after this period of study, eclampsia seems to be impending, section under local or spinal anesthesia is performed. The section may be abdominal or vaginal. The choice depending chiefly upon the period of the gestation and the parity of the patient. Abdominal section is the operation of choice in the primigravidae at or near full term or in the multipara with a definitely viable fetus. Abdominal section will be indicated in the majority of cases for most of the severe cases of preeclampsia occur in primigravida at or near full term. Vaginal section may be the operation of choice where the fetus is definitely not yet viable. These cases are especially suited for spinal anesthesia, in that they are severely toxic, and the spinal anesthetic in no way increases the toxemia. They show a marked hypertension and the fall in blood

pressure usually associated with spinal anesthesia need cause no special concern. Section can be done more rapidly and with greater ease under spinal anesthesia than under either infiltration or block anesthesia and in this type of patient operative time is often a deciding factor. Prolonged conservatism in the management of the preeclamptic patient is a dangerous procedure, for once the eclamptic seizures have occurred the mortality ratio for both mother and child is greatly increased. Ultraconservatism therefore may resolve itself into a most radical attitude. Cesarean section, by abdomen or vagina and the consequent delivery of the fetus removes one of the most important factors in the production of the toxemia, fetal metabolism.

The actual eclamptic should, in my opinion, be treated more conservatively, for as a rule, once the seizures have begun the patient will go into labor in a short time and the uterus may be emptied by vagina with a consequent minimum of shock. The seizures having occurred, section by any method is exceedingly dangerous. Absolute rest should be maintained by the liberal use of morphine; the morphine not only diminishes the patient's irritability but also decreases the acidosis. This type of patient should also be given large amounts of dextrose intravenously. In doing this, one should bear in mind the excellent work of Titus⁶ in estimating the therapeutic dose of dextrose, namely 50 to 75 gm. In many instances dextrose is given in insufficient amounts, the attendant having a false sense of security in the mere fact that intravenous dextrose was given. As the eclamptic patient is usually edematous, the concentrated solutions of 25 or 50 per cent are to be preferred and the dose repeated at intervals as indicated. The liberal use of morphine and dextrose will usually control the convulsions, although, at times the use of magnesium sulphate solution intravenously may be necessary. McNeile⁸ is enthusiastic concerning its use, while Stander² is of the opinion that magnesium sulphate is a very dangerous drug because of the possibility of its producing further liver damage. Stander makes this statement after the experimental use of the drug intravenously on dogs. "As to the question of the use of insulin with dextrose, it seems but rational to accept the attitude of Titus⁷ and others; namely, that these patients are well able to care for a temporary hyperglycemia by the action of their endogenous insulin. Their glycogen deficiency requires dextrose and the dextrose should not be too rapidly destroyed by insulin. In the nondiabetic patient we have not used insulin."

Two characteristic case reports follow, the first, a definite eclamptic and the second considered preeclamptic.

REPORT OF CASES

CASE 1.—A twenty-one-year-old primigravida was admitted to Peck Memorial Hospital July 17, 1929 as preeclamptic. She had been on a low protein diet and regular saline catharsis for several weeks prior to her hospitalization. At 6 A.M.,

July 18, or about eighteen hours after her admission, she developed her first definite eclamptic convulsion. Spontaneous labor occurred either just before or coincident with this convulsion. During the day of July 18, this patient had, in spite of our treatment, eight convulsive seizures. The laboratory findings in this case were as follows: July 18, urine examination showed four-plus albumin with hyaline and granular casts. July 19, blood chemistry showed uric acid 7.48 mg., sugar 115 mg., creatine 2.14 mg., and a CO_2 combining power of 30. Her systolic blood pressure at the time of the first convulsion was 160. The treatment given this patient may be summarized as follows: She received one and a quarter grains of morphine during the first twenty-four hours following the onset of her convulsions. She was given two intravenous injections of 25 per cent dextrose during the first twelve hours following her first convulsion. The first dose being 50 gm., and the second 65. She continued in active labor throughout the day. At 6 P.M., July 18, vaginal examination showed complete dilatation, the membranes ruptured and the vertex almost on the perineum. At this time she was given nitrous oxide-oxygen-ether anesthesia, a median perineotomy was done, and low forceps applied to a left occiput anterior position. She was easily delivered of a living male child weighing 2,670 gm. Following her delivery she made a practically uneventful convalescence being discharged from the hospital, up and walking about in good general condition, on the thirteenth day postpartum. The baby was discharged from the hospital on the same day, in good general condition, weighing 2,640 gm.; and nursing at the breasts. This patient was seen again six weeks after delivery, at which time her systolic blood pressure was 128 and her urine examination essentially negative.

CASE 2.—A twenty-five-year-old primigravida was admitted to Peek Memorial Hospital April 6, 1929 with a diagnosis of preeclampsia. Her laboratory findings were as follows: Urine examination April 6 showed four-plus albumin with many hyaline and granular casts. At this time her systolic blood pressure was 150. Her blood chemistry on admission showed uric acid 6 mg., creatine 1.55 mg., sugar 135 mg., urea nitrogen 17.75 mg., and a CO_2 combining power of 40. She was placed on a lactofarinaceous diet. Free catharsis was established by magnesium sulphate and citrate of magnesia. Absolute rest was maintained by the liberal use of allonal and pantopon. Despite our eliminative efforts and diet, her systolic blood pressure remained high, varying from 150 to 180. Her urine findings remained unchanged. On April 9, three days after her admission, a classical cesarean section was done under spinal anesthesia, the operative time being twenty-four minutes. She was delivered of a living female child weighing 1,866 gm. During her immediate postoperative convalescence morphine was used freely. She made an uneventful recovery, being discharged from the hospital on the fifteenth day postoperative, up and walking about in good general condition. The baby was discharged May 22, taking a formula well and weighing 2,985 gm. This patient was seen when six weeks postoperative and at this time her systolic blood pressure was 124 and her urine examination essentially negative.

SUMMARY

1. Eclampsia is an acute toxemia of pregnancy, characterized biochemically chiefly by an acidosis and "a relative hypoglycemia."
2. Preeclampsia is eclampsia minus convulsions.
3. There is a definite surgical indication in preeclampsia.
4. Cesarean section, abdominal or vaginal, done under spinal or local anesthesia is a rational method of terminating the preeclamptic state.
5. Eclampsia should be considered a nonsurgical condition.

6. The therapeutic effort in eclampsia should be directed toward controlling the toxemia.

7. The toxemia of eclampsia may be controlled by the following means: (a) The liberal use of morphine. (b) Intravenous dextrose in sufficient amount. (c) Avoidance of active surgical procedures. (d) Early delivery without traumatism and the use of measures which decrease the acidosis.

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(For discussion, see page 122.)

THE CONSERVATIVE TREATMENT OF ABLATIO PLACENTAE*

BY GEORGE KORNFELD, M.D., BROOKLYN, N. Y.

(From the Obstetrical Service of the Jewish Hospital)

DURING the years 1918 to 1928 inclusive, there have been delivered on the obstetric service of the Jewish Hospital 16,000 patients. In this series there were found 50 cases of ablatio placenta.

In reviewing the literature on 'premature separation of the placenta, we find that Rigby in 1775 was one of the earliest to differentiate between placenta previa and accidental hemorrhage.

Goodell in 1875 recognized that premature separation of the placenta and accidental hemorrhage are synonymous terms. Couvelaire and Williams were the first to describe placental apoplexy, and from their work the term "Couvelaire uterus" arose.

There are many terms applied to the premature separation of a normally implanted placenta. Those most often heard are, accidental hemorrhage, uteroplacental apoplexy, premature separation of the placenta, abruptio placental, and ablatio placentae. In this clinic we have adopted the term ablatio placentae.

The various clinics agree as to the frequency of this condition. Williams prior to 1915 in a series of 2,000 deliveries, had 17 mild cases of premature separation of the placenta, an incidence of 1-400, and only one severe case.

DeLee of Chicago Lying-In Hospital in reviewing 20,000 histories reported 14 cases of complete placental detachment and 35 cases of partial detachment or an incidence of about 1-300. Essen-Moller and Dorman in their large series of cases found that premature separation of the placenta occurred once in 200 cases. In our series of 16,000 deliveries the incidence was 1-420.

*Read before the Brooklyn Gynecological Society, November 7, 1930.

Ablatio placenta occurs most frequently in the third trimester of pregnancy and in multiparae more commonly than in primiparae. In Holmes' series only 19 per cent of the cases were in primiparae. Although in our series this relationship does not hold true, we find that of our 7 severe cases, 5 occurred in multiparae.

The consensus of opinion today is that there is a relationship between ablatio placenta and toxemia of pregnancy. We often find it associated with chronic nephritis or preeclampsia. Trauma, acute infection, torsion of the uterus, short umbilical cord, sudden rapid delivery of one twin, are also mentioned as occasional etiologic factors. Some go as far as to state that even strong emotional disturbances may separate the placenta. It is agreed by almost all workers that the cause of this entity is a specific toxin.

The specific toxin of this condition produces degenerative changes in the blood vessels of the spongiosa. The rupture of these vessels initiates the hemorrhage with the resultant placental separation.

Our understanding of the pathology of ablatio placentae has been clarified by the work of Braun, Young, Ley, Hofbauer and Williams. Hofbauer has shown that histamine poisoning will produce similar pathologic changes. Williams draws an analogy between the changes found in snake venom poisoning and ablatio placentae. The extreme type described by Couvelaire and Williams shows typical changes in the uterine musculature. The uterus in these cases resembles the picture of a twisted ovarian cyst with its purplish discoloration. Microscopically we find in these cases a separation of the muscle fibers by edema and hemorrhage, with resultant degeneration of the musculature. It is to this extreme picture that the term "Couvelaire uterus" is applied.

The symptoms of this condition vary with the degree of separation of the placenta. When most of the placenta has been separated, the onset is acute, the patient experiencing severe abdominal pain with or without external bleeding. This is accompanied by the classical picture of shock—marked pallor, profuse cold, clammy sweat, rapid thready pulse and anxiety. The uterus is found tonically contracted, tender, with board-like consistency. In concealed hemorrhage the uterus may be larger than the corresponding period of gestation. The fetal heart cannot be heard and fetal parts cannot be palpated. If it were not for the enlarged, tender, board-like uterus the patient would resemble the picture of a ruptured ectopic. The mild case may show only slight abdominal pain with or without external bleeding. Whereas this is a description of the two extremes, many cases may vary between these types, depending on the degree of separation.

In considering the diagnosis of ablatio placentae, it is usually necessary to rule out placenta previa. However, various authors also mention in the differential diagnoses, such conditions as ruptured ectopic.

threatened rupture of the uterus, intraabdominal injury and ruptured appendiceal abscess complicating pregnancy. In differentiating between ablatio placentae and placenta previa, we have in the former, the acute onset with pain, shock, board-like uterus, absence of fetal heart and difficulty in palpating fetal parts. On vaginal examination, no placenta can be felt. In many of the milder cases, the exact diagnoses cannot be established until after the examination of the placenta.

In the past eleven years from 1918 to 1928 there were 50 cases at the Jewish Hospital with the diagnosis of ablatio placentae. In this group, there were 38 cases in which the diagnosis could not be questioned; divided as follows: 20 mild, 11 moderately severe, and 7 severe. The diagnosis in the other cases was most likely correct but as there was some doubt in our minds in reviewing the charts, these histories were not included in our series.

In reviewing our series, the one outstanding feature was the conservative handling of the cases. Many of the mild cases dilated rapidly and therefore required only watchful waiting. Where judicious neglect was not deemed sufficient, rupture of the membranes with or without 2 to 3 minim doses of pituitrin was resorted to. In the more severe cases where dilatation was delayed, or where labor had not begun, a Voorhees' bag was inserted after rupture of the membranes. Patients admitted with shock and severe blood loss, require primarily morphine, rest, external heat, fluids and possible transfusion before treating the premature separation of the placenta. Even though classical cesarean section and hysterectomy are advocated by some authors in the recent literature, only one case in our series was sectioned, and this because of an erroneous diagnosis of placenta previa.

The results of the conservative treatment are best shown in the following tables:

TABLE I. PROCEDURE

No treatment	21 cases
Rupture of membranes with pituitrin	14 cases
Voorhees' bag	2 cases

TABLE II. TYPE OF DELIVERY

Spontaneous delivery	32 cases
Low forceps	4 cases
Version and extraction:	
transverse presentation	1 case
Cesarean section	1 case

Table III demonstrates the result of our conservative treatment. We had no maternal mortality and a low maternal morbidity using as a standard a temperature of 100.4 on two successive days, or a reading of 101 or over on any one day.

TABLE III. RESULTS OF TREATMENT

Maternal mortality	0
Maternal morbidity	7
No morbidity	31

Goodell reports maternal mortality of 50 per cent and Portes maternal mortality of 36 per cent.

The fetal mortality is reported by various others to range between 80 and 95 per cent (Goodell 94 per cent, Portes 81 per cent).

Table IV shows a fetal mortality of 60 per cent.

TABLE IV. FETAL MORTALITY

1. Born alive	15 (40 per cent)
(a) Full term	13
(b) Premature	2
2. Born dead	23 (60 per cent)
(a) Full term	13
(b) Premature	10

One of the two prematures born alive died shortly after birth.

The following case reports describe the morbidity of the cases in Table III.

CASE 1.—Para iii, aged thirty-three, at term. At 1 P.M. on April 27, 1927, patient began to have regular pains every ten minutes. Seven hours later pains every three minutes with slight staining. At 11 P.M. on admission to the hospital, profuse bleeding, patient pale, restless, moderate cyanosis of lips, pulse 132, thready.

Fetal heart not heard, cervix fully dilated, membranes intact, head in brim.

Membranes ruptured artificially; three minims of pituitrin were given by hypodermic; the head was pushed into midpelvis by abdominal pressure; midforceps were applied. There was no difficulty in delivery, stillbirth. Manual extraction of placenta and membranes. Placenta showed separation over three-fourths of its area. On the third day the patient developed paralytic ileus with gastric dilatation and was treated by repeated gastric lavage. Temperature was 102° F. on the fourth day, postpartum, lasting until the thirteenth day. About the fourth day the patient showed a beginning parametritis which had cleared up on the twenty-first day.

She was discharged on the twenty-fourth day in good condition with a diagnosis of ablatio placenta, paralyticileus, bilateral parametritis.

CASE 2.—Patient aged twenty-four, primipara, at term, was admitted on December 16, 1920 at 1:30 P.M.; having spotted slightly at home. At 3:30 P.M. the membranes were ruptured spontaneously with considerable bleeding. The cervix was fully dilated. At 4 P.M. she was having pains every two or three minutes. At 5 P.M. the patient bled considerably with caput visible. At 5:45 P.M. she was delivered spontaneously of a stillbirth. Considerable bleeding followed the expulsion of the baby. Placenta was expressed easily and showed picture of ablatio placenta. Temperature ranged between 100° and 101°, beginning on the third day and lasting four days.

CASE 3.—Patient aged thirty, primipara, at full term, was admitted to the hospital on September 30, 1927 at 8 A.M., with a history of slight staining and slight pains. At 1 P.M. there was moderate bleeding. At 5 P.M. the cervix was four fingers dilated and because of profuse bleeding, the membranes were ruptured artificially. At 10 P.M. a normal male infant was delivered by low

forceps. The placenta showed typical signs of premature separation. The patient ran a temperature of 101° on the twelfth, thirteenth, and fourteenth days postpartum. She was discharged on the twenty-first day with a diagnosis of ablatio placenta and slight parametritis.

CASE 4.—Patient thirty-two years of age, para iii, was admitted to the hospital on June 24, 1927, having shown signs of toxemia in the prenatal clinic. Blood pressure varied between 150 and 170 systolic with albumin and casts in the urine. At 10 A.M. on day of admission the patient noted considerable painless vaginal bleeding, felt weak and dizzy. On examination blood pressure was 186 systolic, no fetal heart heard. Abdomen did not reveal any signs of a board-like uterus. On vaginal examination no evidence of placenta previa was found, cervix was two fingers dilated, membranes were ruptured artificially and three minims of pituitrin were given by hypodermic. Patient delivered spontaneously of a normal living female infant. Placenta showed many areas of infarction and premature separation at the edge of the placenta. Patient had temperature of 101° on the second day and was discharged on the eleventh day.

CASE 5.—Primipara, aged twenty-eight years, at term, came into the hospital with a history of spotting. The membranes were found ruptured and a breech presentation. Pains in back and sides. Because of the breech presentation and a diagnosis of placenta previa, cesarean section performed. (Normal infant delivered.) The operative findings showed the uterus full of blood clots and a partial separation of the placenta. Patient ran a temperature of 103° for two days and developed a femoral phlebitis.

CASE 6.—Primipara, aged twenty-three years, admitted to the hospital with a history of seven months' pregnancy, slight pains and slight staining. On examination, the blood pressure was 165 systolic, uterus was tense, considerable vaginal bleeding but no pain. No fetal heart was heard. At 3 P.M. rectal examination showed no dilatation, considerable bleeding, uterus large and firm, tonically contracted. At 6 P.M. a number 4 Voorhees' bag was inserted after rupture of the membranes. At 10 P.M. the patient delivered of a premature stillbirth. Placenta was expressed and showed definite signs of premature separation. Patient ran a temperature of 101° for one day and 100.6° for one day. She was discharged on the twelfth day.

CONCLUSION

This series, though small in number, demonstrates that the conservative treatment of ablatio placentae gives far better results than the radical methods that are still advocated by various authors today. Our low maternal morbidity and absent mortality warrants one continuing the conservative treatment of ablatio placentae.

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(For discussion, see page 121.)

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(For discussion, see page 121.)

A CASE OF PLACENTA ACCRETA*

BY ARTHUR CHARLES TIEMEYER, M.D., F.A.C.S., BALTIMORE, MD.

PLACENTA accreta is a rare complication of pregnancy in which there is a more or less complete absence of the decidua basalis, and in which the chorionic villi invade the musculature of the uterus.

The following case is typical of placenta accreta and seems worthy of reporting:

Mrs. M. P., white, aged thirty-three years, para viii, was admitted to my service at the West Baltimore General Hospital, June 28, 1930, with a diagnosis of retained placenta. Six hours before admission, she was delivered at her home, by her family

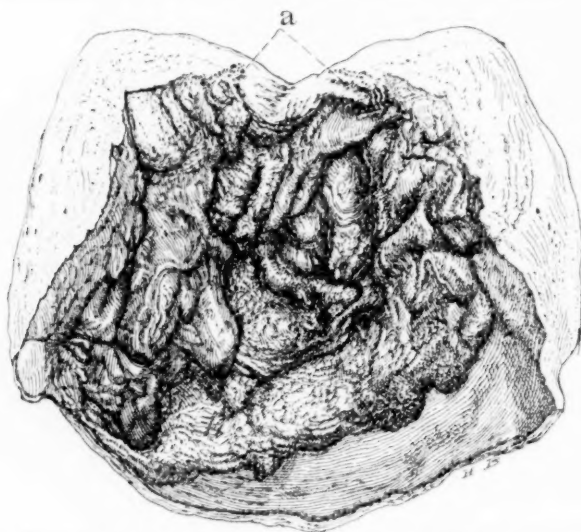


Fig. 1.—Drawing from the original photograph of placenta accreta, showing thinning of the uterine wall and invasion of the myometrium, particularly at the fundus (a). The placenta has been torn away but portions remain attached to the uterine wall.

physician, of a living female child of thirty-two weeks' gestation, which weighed 2048 gm. The labor lasted forty minutes. After two hours there was no placental separation and no bleeding. Several unsuccessful attempts were made to express it by Credé's maneuver and then manual removal was tried. Several pieces of placental tissue were removed but because of the inability to separate a large portion of the placenta and because of hemorrhage, further efforts to remove the remaining placenta were abandoned and the patient sent into the hospital, where another unsuccessful attempt at Credé's expression was made. Then, under nitrous oxide-ether anesthesia, the hand was introduced into the uterus and as no line of cleavage could be felt between the placenta and the uterine wall, a tentative diagnosis of placenta accreta was made. It was impossible to separate the placenta from the uterine wall and had attempts at removal been persisted in, portions of the uterine wall would have been torn away or the uterus perforated. The uterine wall at the

*Read before the Baltimore Gynecological and Obstetrical Society, October 24, 1930.

fundus was very thin. The patient was shocked and it was thought advisable to postpone operation until she had reacted sufficiently. The uterus was tightly packed and the patient returned to her bed. The following morning a supravaginal hysterectomy was done. Her convalescence was stormy but she made a good recovery and was discharged from the hospital on the twenty-seventh day after operation.

Pathologic report by Dr. Manuel Giehner, pathologist of the hospital:

Gross.—Specimen consisted of a postpartum uterus removed supravaginally and contained a large portion of the placenta densely adherent to the uterine wall, particularly at the fundus where the placenta was most densely adherent and seemed to invade the musculature.

Microscopic.—Sections prepared included the uterine wall and the adherent placenta. No evidence of decidua basalis was seen and in several areas notably at the fundus, chorionic villi invaded the underlying musculature and formed inter-



Fig. 2.

Fig. 2.—Photomicrograph x42, showing invasion of chorionic villi into the myometrium and an entire absence of the decidua basalis. The increased vascularity of the uterine wall is apparent. Some villi appear just beneath the peritoneum.



Fig. 3.

Fig. 3.—Photomicrograph x42, showing invasion of uterine wall by chorionic villi and the absence of decidua basalis.

digitations with strands of muscle. About these areas of invasion there was marked increase in circulation and considerable free blood in the tissues.

Diagnosis.—Placenta accreta.

The important points in her history were as follows: There were 8 pregnancies in fourteen years. All were normal except the seventh and the present one. The seventh pregnancy terminated from some undetermined reason at the twenty-eighth week and was complicated by retained placenta and sepsis. On the tenth day postpartum she was removed to a hospital; the uterus was curetted and portions of the placenta removed. Her convalescence was marked by twenty-seven days of fever and she remained in the hospital for thirty-six days following her operation. After her discharge from the hospital, she had a profuse leucorrhea which lasted well into

her present pregnancy. Her menstrual periods were increased from six to ten days, although the flow was not more profuse than before the curettement.

There are varying degrees of placenta accreta. Sometimes there is only an absence of the decidua basalis but in other cases the chorionic villi invade the musculature of the uterus and occasionally actually become a part of the uterine wall. The characteristic feature of this condition is that there is no line of cleavage between the placenta and the uterus, because of the absence of the decidua basalis. The decidua basalis is made up of two layers, a compact layer, superimposed upon a spongy layer. The latter adjoins the muscular wall of the uterus. It is in the spongy layer of the decidua basalis that the placental separation takes place. Hence, in the absence of this decidua, normal placental separation cannot take place.

In some cases, as in the one here reported, the uterine wall is thin and evidence of degenerative muscular changes in the vicinity of the invading villi are seen. Because of this thinning, the uterine wall is weakened and rupture has been a frequent complication. Cases have been reported by Klaften,¹ Klosterman,² Dietrich,³ and others.

Nathanson⁴ has suggested that the term accreta be applied to those cases where there is an insufficient development or an entire absence of the decidua basalis, and increta when there is an invasion of the myometrium by the chorionic villi. Placenta accreta, however, is the term used by the majority of the authors and will be used throughout this paper.

The incidence of placenta accreta varies in the different clinics. Polak⁵ found it once in his 6,000 cases and B. C. Hirst once in 40,000. J. Whitridge Williams has seen one case in the 40,000 patients delivered on his service in the Johns Hopkins Hospital. Nathanson⁴ in 1928 reviewed the literature and found only 36 cases on record. Since then Blagadarow,⁶ Klostermann,² Reeb⁷ and Wilson,⁸ have each reported a case and with the one here reported, there has been a total of only 41 cases in the literature.

In all cases reported, placenta accreta has occurred in women who have previously borne children or who have had an abortion followed by curettement or sepsis. The rapidity with which the pregnancies occurred had some relationship to the frequency of this abnormality. In cases of severe curettement or where the endometrium has been more or less destroyed by infection with an invasion of connective tissue, normal decidual reaction does not take place. A normal endometrium is necessary for the proper development of the decidua. Other factors, however, enter into the formation of the decidua and one cannot say that previous pregnancy was necessary for the development of placenta accreta. It is believed that the hormones from the corpus luteum control the formation of the decidua, and abnormalities of the corpus luteum may have some bearing on the

formation of this condition by producing a defective decidua basalis. A uterine diverticulum and submucous fibroids have been mentioned as causes. Syphilis has not been mentioned as an etiologic factor in any of the reported cases.

The diagnosis cannot be made until the placenta fails to separate and the interior of the uterus explored. It will then be found that no line of cleavage exists and that the placenta cannot be removed from the uterine wall without tearing away a portion of the uterus. Unless the placenta is torn during efforts to remove it, there will be no hemorrhage, because there has been no placental separation. The final diagnosis can only be made by microscopic examination of that portion of the uterus where the placenta is attached and by finding an absence of the decidua basalis and an invasion of the musculature by the chorionic villi.

The prognosis is grave because of the liability of rupture of the uterus and hemorrhage during attempts at removal of the placenta, and also from subsequent sepsis. There are comparatively few cases on record where the diagnosis was made in the living woman, most of the conditions having been recognized only at autopsy. Very few cases are on record where the patient recovered, and this case is one of them.

There appears to be only one logical treatment for this abnormality and that is hysterectomy. Because of the thinning of the uterine wall, manual removal of the placenta or curettement is dangerous because of the possibility of perforation of the uterus. When the placenta fails to separate in the absence of hemorrhage, it is safe to wait several hours for the delivery of the placenta. Then one may attempt to express it by Credé's maneuver or by the Mojon-Gabaston method and if unsuccessful, the gloved hand should be introduced into the uterus with the strictest aseptic technic. If no line of cleavage can be found, the hand should be removed without attempting to separate small pieces of the placenta, the uterus tightly packed and, as soon as convenient or as soon as the condition of the patient justifies it, a supravaginal hysterectomy should be performed. If considerable blood has been lost from partial detachment of the placenta, it would be better to transfuse the patient before or at the time of operation.

SUMMARY

Placenta accreta is a rare complication of pregnancy and there have been reported only 41 cases. The characteristic features of this abnormality are an absence of the decidua basalis and an invasion of the musculature of the uterus by chorionic villi. The dangers are perforation of the uterus, hemorrhage, shock and sepsis. Rupture of the uterus may occur during the latter part of pregnancy. The prognosis

is grave because the diagnosis is not often made before serious complications have resulted, and instrumental removal of placenta is usually followed by perforation of the uterus.

Supravaginal hysterectomy offers the best prognosis and should be done in preference to manual removal or curettement of the uterus.

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207-8 MEDICAL ARTS BUILDING.

(For discussion, see page 127.)

AN ANALYSIS OF 115 CASES OF PLACENTA PREVIA*

BY ISADORE A. SIEGEL, A.B., M.D., BALTIMORE, MD.

(From the Obstetrical Department, University of Maryland Medical School)

PLACENTA previa and its treatment is an obstetric problem which still demands the serious consideration of the profession. This fact is emphasized by the great maternal as well as the great fetal mortality which occurs in this complication. This is particularly true when the older methods of treatment, such as bagging, internal podalic version, and breech extraction are employed.

Let us consider the mortality figures for placenta previa treated by the vaginal route as reported in the literature.

Hitchmann in a study of 5868 cases of placenta previa collected from various European Clinics reports a total maternal mortality from all causes as varying from 9.3 per cent to 38 per cent with the lowest maternal rate of 3 per cent in the partial type. The Johns Hopkins Clinic in a study of its cases for a period of twenty-three years gives a gross mortality of 8 per cent. McPherson in his report gives a mortality of 12.1 per cent; Broadhead 9 per cent; Munro Kerr 11.5 per cent to 13 per cent; Doederlein 19 per cent; Kronig 18.2 per cent; Miller 20 per cent; and Chacoloris 15.5 per cent. Kellogg in a report of 303 cases over a period of fifteen years, in which the bag was the principal method of treatment, concludes that this form of handling placenta previa cannot reduce the maternal mortality to less than 6 per cent. Statistics as to the fetal death rate in placenta previa treated by the vaginal route varies from 40 to 90 per cent. These data from various parts of the world must be considered as reliable evidence that this so-called conservative method treating placenta previa is not productive of happy results for either the mother or the child.

When we further consider the actual causes of the maternal mortality following vaginal delivery, we are impressed with the great

*Presented at a meeting of the Baltimore Gynecological and Obstetrical Society, October 24, 1930.

number of deaths due to ruptured uteri, as well as those due to hemorrhage either from the relaxation of the lower uterine segment or from atonic uteri. Hitchmann in his report states that 33 per cent of the deaths were due to ruptured uteri and that deaths from bleeding due to relaxation varied from 1.3 per cent to 15 per cent. Kellogg reports that 50 per cent of his deaths were due to ruptured uteri. Depkin found that about one-third of his deaths were due to bleeding from lacerations. Von Mikulicz states that 75 per cent of his deaths could be attributed to hemorrhage. These deaths from ruptured uteri and hemorrhage we believe can be and should be avoided.

In investigating the cause for this high mortality in placenta previa due to ruptured uteri and hemorrhage, Sellheim, Krönig, Bill, Kellogg, and others believe that the factor lies in the structure of the lower uterine segment. The implantation of the placenta in the lower uterine segment and about the internal os produces a very thin, friable and very vascular condition of this part of the uterus. When this placental site is stretched to permit the delivery of the child per vaginam, the danger of rupture through this thin muscular and highly vascular area is always imminent. In addition to this the contractility of the lower uterine segment is destroyed or impaired and this loss favors postpartum hemorrhage. If these facts are true, as they seem to be, we must look to a method of delivery which will avoid these accidents, and which will reduce this great maternal and fetal mortality in the greatest number of cases of placenta previa.

Cesarean section has been advocated by many writers as the best hope for avoiding these accidents and for obtaining better results for the mother, as well as for the child. They believe that by this operation the placental site is not disturbed and that the contractility of the lower uterine segment remains uninjured, so that neither rupture of the uterus nor postpartum bleeding is apt to occur. In addition to this the fetal mortality, even in those cases where the fetus is premature, has been reduced to 21.9 per cent, although DeLee states that cesarean operation has reduced the fetal mortality from 50 per cent to 5 per cent.

Do the figures on placenta previa treated by cesarean section confirm this belief that the maternal mortality can be reduced? In Table I we have collected from the literature 759 cases of placenta previa treated by cesarean section, giving a gross mortality of 3.16 per cent. The individual maternal death rate varies from 0 to 9 per cent in this series. Winter collected 745 cases of placenta previa from the various clinics in Europe which were treated by cesarean section giving an operative mortality of 3.9 per cent and a gross mortality of 5.9 per cent. These gross mortality figures for placenta previa treated by cesarean section are far better than the gross figures for the vaginal deliveries.

TABLE I

WRITER	NO. OF CASES	NO. OF DEATHS	PER CENT
DeLee	42	0	0
Bill	57	1	1.78
Frey (Zurich)	88	1	1.14
Proceedings Royal Society	19	1	5.26
Willett	14	1	7.1
Munro Kerr	17	0	0
Von Mikuliez-Radecki	31	1	3.3
Irving	57	2	3.5
Hitchmann	191	7	3.6
Welz	14	0	0
Stoekel	31	1	3.0
Schweitzer	11	0	0
Depkin	11	1	9
Gordon	98	7	7
Lull	5	0	0
Quigley	5	0	0
Humpstone	10	0	0
Siegel (University of Md.)	45(+13 in 1930)=58	1	1.72
Total	746(+13)=759	24	3.16

When should cesarean section be employed in the treatment of placenta previa? There are some authorities who believe that cesarean operation should be limited to the central type occurring in primiparae with an undilated cervix and with a viable child near term. On the other hand, such writers as Dr. Bill of Cleveland advocate this operation in all types of placenta previa where the cervix is undilated but insist that the best results can be obtained when prophylactic blood transfusions are employed prior to operation. In a previous paper on this subject we advocated cesarean section as a more conservative method of treatment for placenta previa. We found after a study of our own cases that we were able to reduce our maternal, as well as our fetal mortality, by this procedure. Since that report we have been employing cesarean operation more and more in all types of placenta previa, in which the cervix is closed and the uterus contains a viable child, with gratifying results.

From 1920 to 1929 inclusive we treated in the Obstetrical Division of the University Hospital 115 cases of placenta previa; of this number 77 were white and 38 negro patients. The age of the youngest was fourteen years and the oldest fifty-one years. Sixty-four cases occurred between the ages of fourteen and twenty-nine. Forty-five occurred between thirty and thirty-nine and six between forty and fifty-one. The largest number of pregnancies occurring in any one case was 18 with an average number of 4.56.

As to the duration of pregnancy: 31 cases occurred prior to thirty-six weeks' gestation; 26 between thirty-six and thirty-eight weeks; 56 between thirty-eight weeks and term, and in 2 cases the duration of pregnancy was not noted.

The central type of placenta previa was found in 36 cases; the marginal type in 48; the lateral type in 22; the low implantation in 3, and in 6 cases the type was not noted.

In the treatment of placenta previa we employed internal podalic version and breech extraction in 47 cases, after having first inserted a bag or by completing the dilatation of the partially dilated cervix. Breech extraction alone was done in 4 cases; forceps in 3; spontaneous delivery in 16, and cesarean section in 45 cases. Since this report we can add 13 more sections giving a total of 58 cases.

The gross maternal mortality for all cases was 7 deaths or 6.08 per cent. Seventy cases were treated by the vaginal route which resulted in 6 deaths, a mortality of 8.57 per cent. In these 6 patients internal podalic version and breech extraction was done. One death or 1.72 per cent followed cesarean section. In the 6 fatal cases delivered by the vaginal route, 5 were due to hemorrhage and one to ruptured uterus. The one death following cesarean section was due to puerperal infection.

The gross fetal mortality for all cases was 52 or 44.86 per cent. In the 70 patients delivered vaginally 44 or 62.08 per cent of the babies were lost, while 8 or 17.39 per cent of the babies died following cesarean section. Of the babies delivered by the vaginal route, 19 were premature stillborn; 19 were born alive prematurely and died before leaving the hospital, while 13 were full term, stillborn. The interesting feature in this study lies in the cesarean section babies. In spite of the fact that 22 were premature, ranging from twenty-eight to thirty-seven weeks, all but 4 of these babies were discharged from the hospital alive. If we group the babies born by cesarean section between thirty-four and forty weeks, we have 41 such babies with only 6 fetal deaths, 5 due to prematurity and one full term congenitally malformed. These figures indicate that many premature babies can be saved without compromising the mother. In Table II one can see at a glance the apparent advantage of cesarean section in indicated cases over the vaginal method of delivery both for the mother and the child.

TABLE II. SUMMARY FOR ALL CASES

TREATMENT	NO. CASES	MATERNAL MORTALITY	FETAL MORTALITY
Internal podalic and extraction	47	6 or 12.77%	29 or 61.7 %
Breech extraction	4	0	3 or 75.0 %
Forceps	3	0	1 or 33.3 %
Spontaneous	16	0	11 or 68.75%
Cesarean section	45 (& 13)	1 or 1.72	8 or 17.39%
Total	115	7 or 6.08%	52 or 44.86%

In Table III we report 70 cases of placenta previa delivered by the vaginal route, showing the various types of placental implantations and the number of deaths occurring in each type. This study seems

to indicate that the central type of placenta previa gives the greatest maternal death rate, although the other types may give the same unhappy results. A fact of greater importance, however, is that the method of delivery perhaps is the real cause of the large mortality. In Table IV, where we report the types of placenta previa for which cesarean section was performed, we find that the type of placenta previa has no particular bearing on the good results.

TABLE III

METHOD OF DELIVERY	TYPES		DEATHS
Vaginal deliveries 70 cases	Central	15	2
	Marginal	28	1
	Lateral	19	1
	Low implantation	2	0
	Not typed	6	2
	Total		6 or 8.57%

TABLE IV

METHOD OF DELIVERY	TYPES		DEATHS
Cesarean section 45 cases	Central	21	1
(43 classical	Marginal	20	0
1 low cervical	Lateral	3	0
1 porro)	Low implantation	1	0
	Total		1 or 2.2%

The study of these cases has produced nothing new in regard to the incidence of placenta previa, its etiology and the frequency of the various types. However, this study does seem to impress us with the value of cesarean section in all types of placenta previa where the cervix is closed and the fetus viable. The study further shows that the vaginal method of delivery in these cases should be relegated to the marginal and lateral types of placenta previa where the cervix is dilated or easily dilatable, where the fetus is nonviable and where there is evidence of infection.

We firmly believe that our success in the use of cesarean section in the treatment of placenta previa lies in the fact that we insist upon an early diagnosis and an immediate emptying of the uterus. Any case in which painless bleeding occurs in the last trimester of pregnancy, without obvious explanation, is considered by us *prima facie* evidence of placenta previa unless otherwise proved, and we immediately make the necessary examinations to confirm the diagnosis. The moment the diagnosis is made we empty the uterus without delay. Placenta previa is one condition in which delay in delivery may mean serious or even fatal bleeding. Too often have we seen patients with placenta previa who have bled but little and appear in excellent con-

dition, and for that reason delivery is postponed. Then, suddenly, without any warning the patient has a profuse and serious hemorrhage. A woman having a placenta previa should not be temporized with because an apparent additional small hemorrhage may prove fatal. We further maintain that no cesarean section should be done without first having fortified the mother with a preoperative blood transfusion in those cases where hemorrhage has been marked, or by the giving of fluids by hypodermoclysis or intravenously when suitable donors cannot be secured. Neglect to carry out this important measure will spell the difference between success and failure. We believe, with Bill of Cleveland, that the proper preoperative preparation of these patients will continue to reduce the maternal and fetal mortality in placental previa by the use of cesarean section. In our series of cesarean sections we have packed the uterus postoperatively in only one case, and we have not had a single postpartum hemorrhage. This we believe is due to the fact that the patient is fortified preoperatively by blood transfusion and fluids, which prevent an atonic uterus and that the placental site and the contractility of the lower uterine segment are not disturbed.

We do not advocate cesarean section in the interest of the child but, since this procedure diminishes the risk for the mother, we ought to consider the child as well. The high fetal mortality which occurs in the vaginal deliveries cannot be attributed primarily to prematurity, but rather to asphyxiation from hemorrhage and to physical injury inflicted on the premature fetus in dragging it through a crowded pelvis. We agree with Watson who says, "even when the child is premature cesarean section offers a better chance of life than any other form of delivery so that if pregnancy has advanced beyond thirty-four weeks it must be considered from this point of view. Yet, when we use a bag in a case of central placenta previa and especially when we do an early version and bring down a leg, using the child as a plug, we are sacrificing it almost as deliberately as when we do a craniotomy." Our figures show that by cesarean section we have reduced the fetal mortality to 17.39 per cent and if we consider only those cases beyond thirty-four weeks our fetal mortality is only 14.3 per cent.

CONCLUSIONS

1. The routine treatment of placenta previa by the vaginal route continues to give a high maternal and fetal mortality.
2. Cesarean section performed early, with prophylactic blood transfusions and preoperative fluids in all cases of placenta previa when the cervix is closed, seems to be the method of choice in the interest of the mother, as well as the child.
3. The vaginal method of delivery should be restricted to those

cases of lateral and marginal types of placenta previa where the cervix is dilated, fetus nonviable and patient potentially infected.

4. Most premature fetuses can be saved in indicated cases of placenta previa when cesarean section is employed.

I wish to express my appreciation and thanks to Drs. J. M. H. Rowland and Louis H. Douglass for their many suggestions and advice in preparing this paper.

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1704 EUTAW PLACE.

(For discussion, see page 128.)

Ottow: Deep Phlegmon of the Thigh Following Extension of a Parametrial Infection Through the Obturator Foramen. Zentralbl. f. Gynäk. 53: 2843, 1929.

This report concerns a deep phlegmon of the outer surface of the thigh reaching halfway to the knee, and of the inner surface of the same thigh, however of smaller extent. The patient, a thirty-two-year-old para ii had a chronic infection and swelling of both labia majora for four years. The right side healed. Pregnancy ensued, and at four months the infected area on the left was excised. There followed abortion with chills, fever, and septic, pyemic condition three weeks after excision. Examination showed the pelvis to be normal except for a hen's egg-size area of dense resistance on the anterior pelvic rim in the region of the obturator foramen extending to, but not reaching the uterus which was small and movable. There was a free zone between this thickening and the uterus. The left labium showed an edematous, elephantine swelling. Phlegmons developed as described, and in addition there was edema and thrombophlebitis of the deep veins of the leg. Patient died. Autopsy showed multiple metastatic abscesses of the lungs. The author traces the course of the infection as follows: puerperal infection following abortion, after excision of labial area of infection; blood-borne infection with localization at the brim of the pelvis in the tissues around the obturator artery; from thence, direct extension through the obturator foramen and the ischiadic foramen to the tissues underlying the gluteal musculature, and deep in the adductor musculature. The prognosis of such phlegmons is very dubious.

WILLIAM F. MENGERT.

HEMORRHAGE FROM A RUPTURED VARICOSITY IN THE PLACENTA CAUSING THE DEATH OF THE FETUS*

BY MORRIS LEFF, M.D., NEW YORK, N. Y.

THERE is no mention made in any textbook on obstetrics of this condition and only one other similar case has been reported.

Mrs. M. S., aged thirty, married eight years. Two years ago, she aborted in the third month. She became pregnant again and went through a normal antepartum period.

On July 22, 1930 at 11 P.M. she was admitted to the hospital in labor at term. Her pains were slight and infrequent. Her condition was good. The fetal heart was 130. Vaginal examination disclosed the cervix to be one finger dilated, membranes intact, the head presenting. She continued to have slight pains and slept during the intervals. At 2 A.M. while dozing she had a pain and with it there was a gush of blood from the vagina.

A vaginal examination was immediately made to determine the cause of the bleeding. The cervix was found to be two fingers' dilated, the membranes apparently ruptured, the head in midpelvis. There was no evidence of placenta previa. The fetal heart sounds were rapid and feeble and in about five minutes they disappeared entirely. The patient's pulse was 80, and her general condition was good. The abdomen was soft, the uterus was not tender or rigid.

As the fetus was dead and the condition of the mother was normal, there did not appear to be any indication for interference and the labor was allowed to progress spontaneously.

The bleeding did not recur, with the exception of small squirts after each pain. The labor progressed regularly, the pains later becoming stronger, and the patient delivered a dead fetus at 10 A.M., six hours after the bleeding.

The placenta was expressed in about three minutes, with just a few small blood clots and little fresh bleeding. It was of medium size, well formed, and had no sclerotic areas due to infarcts. The maternal surface had no adherent blood clots, no indentations and no other evidence of premature separation. The cord was attached a little off the center of the placenta, of medium length, and showed no abnormalities.

However, when the fetal surface of the placenta was examined, it showed several patches of thin layers of old blood under the amnion. On the strength of that, it was suspected that the bleeding must have occurred from that side of the placenta. The exact site of the bleeding could not be determined on inspection. In order to locate the bleeding point, a syringe and needle was used to inject the umbilical vein with water. The water promptly passed out from a little opening on the fetal surface of the placenta, which evidently was the site from which the hemorrhage had occurred. The lesion was a rupture of a small varicosity about 2 mm. in diameter, located about 3 cm. from the periphery on the fetal surface of the placenta (Fig. 1).

From this finding we may infer what had happened. There was a small varicosity in one of the veins on the fetal surface of the placenta. It withstood the tension as long as the membranes were intact. The amniotic fluid exerting counter pressure against the vessels during the pains; but when the membranes ruptured, that counter pressure was gone and the varicosity ruptured. We therefore had the gush of blood simultaneously with the rupture of the membranes.

*Presented before the Section of Obstetrics and Gynecology of the New York Academy of Medicine, November 25, 1930.

It is evident that the blood loss was entirely fetal, none of it coming from the mother. That is why the hemorrhage promptly caused the death of the fetus, while it had no effect on the mother. When the fetal heart stopped beating the bleeding ceased, and only a little blood squirted out with each contraction of the uterus.

What to do at the time of the hemorrhage, was the problem to decide. The first consideration of placenta previa was ruled out by a vaginal examination. The next was to consider an extensive separation of the placenta which would account for the sudden death of the fetus. As the condition did not warrant interference, the policy of letting the labor proceed normally proved to be the proper procedure.

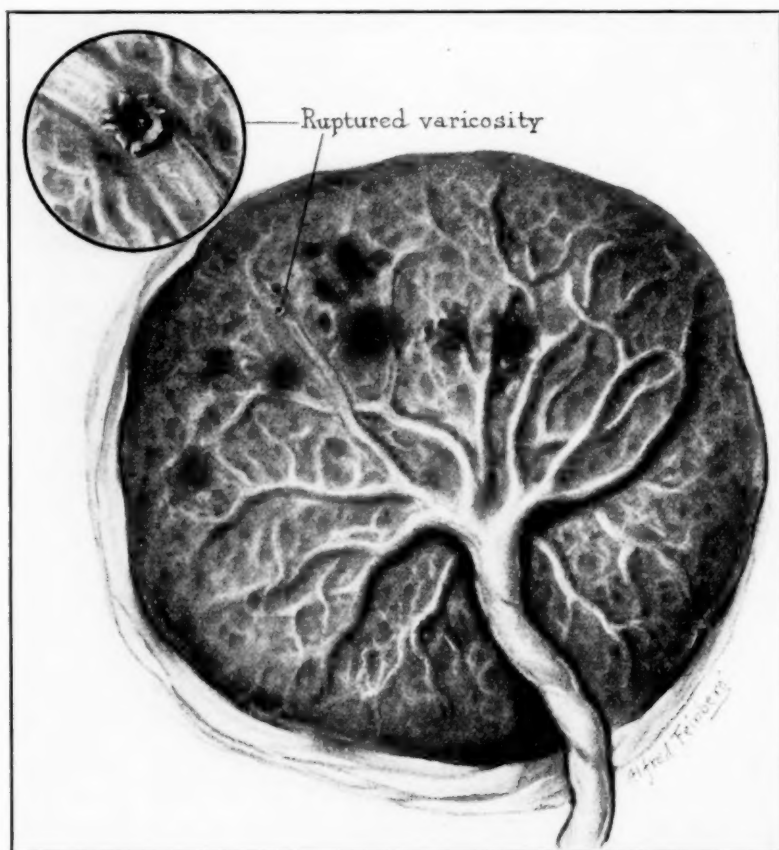


Fig. 1.—Fetal surface of placenta showing ruptured varicosity; and some blood clots under amnion.

There is one other condition that had to be considered which resembles this case, and that is a rupture of a velamentous cord. Kosmak¹ reported two such cases in 1922 and 1928.

The only other case in the literature of a rupture of a varicose vein in the placenta was reported by Rannenberg² in 1924.

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15 EAST ONE HUNDRED AND ELEVENTH STREET.

Society Transactions

PHILADELPHIA OBSTETRICAL SOCIETY

MEETING OF NOVEMBER 6, 1930

DR. WALTER F. HARRIMAN presented a report of a case of **Pedicated Cystic Fibromyoma Arising From the Fundus Uteri Removed Postpartum.**

Mrs. D. M., the patient, a thirty-year-old primipara, from whom this tumor was removed on the seventh day postpartum was first seen by Dr. Longaker on April 3, 1930.

Married seven years, sterile (by design). Her last regular menstrual period, as always painful, had occurred on December 27, 1929. Her habit was of the twenty-eight-day type, flow lasting four days. On the twenty-fifth of January, the twenty-third of February, and on about the twentieth day of March there was a free gush of blood painlessly expelled, but at none of these dates did the bleeding continue more than a part of one day.

Pelvic examination confirmed the diagnosis of a three months' pregnancy, complicated by retroversion.

A week later Mrs. M. again came to the office complaining of a chocolate brown discharge and pelvic distress. While in the knee-chest position a retrouterine tumor the size of a grapefruit was dislodged from the culdesac.

Rest, sodium iodide and bromide tided her over the threatened danger of aborting.

On September 9, 1930, the thirty-sixth week of gestation, a five-pound girl baby was born without special incident.

The tumor at that time was the size of an average fetal head, in the right upper quadrant, and attached to the midfundus by a stout short pedicle. Its surface was perfectly smooth and hard, not painful on pressure. On the following day the mass had moved into the left lumbar region. Surmounting the fundus it had occasioned no difficulty during the partum or postpartum period.

On the sixth day, this mass which proved to be a cystic fibroid, was removed. Its pedicle the size of a thumb sprang from the fundus. There was an extensive fan-shaped omental adhesion to the upper surface of the tumor. The base of the pedicle was excised from the uterine wall by a wedge-shaped incision. Suturing this incision was like putting sutures through cheese; they cut out. Hemostasis, nevertheless, was satisfactory. From this viewpoint an early postpartum operation would have offered less risk and less difficulty. The patient made a perfect convalescence and left the hospital in fifteen days. Within a month she was readmitted to the hospital and a gangrenous appendix removed. Drainage followed, convalescence was perfect.

The tumor was a cystic fibromyoma in our opinion although another pathologist made a microscopic diagnosis of sarcoma.

DR. J. V. KLAUDER AND DR. HERMAN BROWN presented a paper entitled **A Study of the Calcium-Phosphorus Ratio in the Serum of Syphilitic Pregnant Women.** (For original article see page 60.)

ABSTRACT OF DISCUSSION

DR. HERMAN BROWN.—For some years we have been interested in calcium potassium and calcium-phosphorus ratio studies, especially in relation to syphilitic pregnant women, and especially in view of the fact that calcium-phosphorus metabolism is observed in pregnancy and is intimately concerned with those cases that are congenitally syphilitic. There is undoubtedly a definite connection in such cases, so it seemed reasonable that the syphilitic involvement may be associated with the observation of the calcium-phosphorus metabolism in the syphilitic mother.

Accordingly we selected ten patients in each of four groups, comprising, as a matter of control, syphilitic nonpregnant women, syphilitic pregnant women, normal pregnant women, and nonchildbearing women who were not syphilitic. White as well as colored were included. Wassermann tests were made in all cases.

Very few studies have been made of calcium phosphorus in pregnancy. It is the consensus of opinion of most investigators that calcium shows very low normal figures in pregnant women compared with nonpregnant women.

It is interesting to note in this connection that Dr. Blair Bell, of the Royal Infirmary, Liverpool, routinely prescribes large amounts of calcium lactate for pregnant women.

DR. A. CANTAROW.—The subject of mineral metabolism in pregnancy has received considerable attention during the past few years. It is the consensus of opinion of most observers that the serum calcium gradually diminishes during the course of pregnancy. This has been ascribed to two factors:

1. The growing demands of the fetus, which, increasing from about 6 mg. of calcium daily in the first four months to about 600 mg. daily at term, place an excessive burden on the material organism.
2. An actual retention of calcium and phosphorus by the maternal tissues, in amounts far greater than can be accounted for by fetal utilization. This retention is most marked in the later months and occurs in association with the diminution in serum calcium.

This phenomenon perhaps represents the establishment of a calcium reserve which may be called upon during subsequent emergencies, one of which is lactation. The transition from pregnancy to lactation is characterized by a decided alteration in mineral metabolism, a change from a markedly positive calcium balance to an equally marked negative balance. The loss of calcium occurs not only in the milk, but also in the feces, the fecal calcium content at times exceeding the calcium intake.

It is believed by some that these alterations play an important part in the development of osteomalacia, maternal tetany and eclampsia.

In dealing with ratios between various inorganic constituents of the blood one is treading upon uncertain ground. We know too little concerning the several forms in which these elements exist to enable us to attach much clinical significance to such immaterial values. It is known that perhaps only 50 per cent of the total serum calcium, existing in diffusible form, normally takes part actively in the process of calcification. Why then include the total calcium in a determination of the Ca:P ratio in its relation to calcification? Since the ratio of diffusible to nondiffusible calcium changes during the course of pregnancy, as does the total serum calcium concentration, the calcium-phosphorus ratio early in pregnancy must be considered in an altogether different light from that late in pregnancy.

It is my opinion that studies of mineral metabolism during pregnancy should

be actively pursued inasmuch as they may shed light upon an element which, in its metabolism, undergoes profound changes during the period of parturition and lactation.

DR. KLAUDER (closing).—It is important to bear in mind that total serum calcium estimation gives only one view of a very complex mechanism. Diffusible calcium, calcium-potassium ratio, and calcium-phosphorus ratio are other phases. Again, it is likewise important to consider that estimation of serum calcium is not necessarily an index of metabolism of tissue calcium.

In our study we were searching for a clue. Had that clue been found, we would have pursued the study further.

DR. C. MAZER AND DR. I. ANDRUSSIER presented a paper entitled **The Incidence, Diagnosis and Treatment of Functional Sterility**. (For original article see page 46.)

BROOKLYN GYNECOLOGICAL SOCIETY

STATED MEETING, NOVEMBER 7, 1930

DR. GEORGE KORNFELD read a paper entitled **The Conservative Treatment of Ablatio Placentae**. (For original article see page 101.)

DISCUSSION

DR. JOHN O. POLAK.—For years I have advocated just this plan of treatment in my service, and though we have not had as good results, having one maternal death in our series and two hysterectomies, both done for the condition that is so vividly described by Dr. Williams, we feel that our results have been encouraging.

The whole point of treatment hinges on the early diagnosis and instituting treatment before the uterus has lost its tone. Where early diagnosis is made I do not believe that these extreme cases occur with any such frequency as the teachings of DeLee or Williams lead us to infer.

We have followed practically the identical treatment outlined by Dr. Kornfeld except that we have ruptured the membranes rather more frequently and have used pituitrin repeatedly in small doses with an initial dose of morphine. We have not had as many forceps deliveries, that is to say, proportionately as are recorded in this series.

DR. CHARLES A. GORDON.—I was wondering whether perhaps it was the intent of Dr. Kornfeld to say that cesarean section should not be done at all. I do not think that was his intent. We have all seen cases where section apparently was the only way out. In the last few days we had a case in St. Catherine's Hospital where there was a rupture of the uterus as well. Certainly nothing but section would have saved that patient. Two months ago we had another patient that came into the hospital and she died in a half hour, before anything could be done for her.

It seems to me that there should be some revision of the terminology and that the term abruptio placentae or ablatio placentae should be reserved for a complete separation, the tragic type necessarily, and the term separation of the placenta used for those cases in which the separation is not complete.

DR. HENRY M. MILLS.—At the Kings County Hospital, I have been impressed with the value of blood transfusion. One patient came in at night. The resident found the cervix dilated and the patient was delivered of a small child (she was

seven months pregnant) by Braxton-Hicks, and by slow delivery the hemorrhage was controlled. The next morning the woman was in extremis, and we gave her 500 c.c. of whole blood intravenously with the result that she made an uneventful recovery. The other case was that of a woman who had been sectioned before. She was at term. She was in the ward for several days. She had bleeding at home. In the hospital she was bleeding very little. One morning, in making rounds, we found something changed in her condition; she was very pale, her pulse was almost imperceptible, and we felt, although there was no vaginal bleeding, or very little (the cervix was closed), that she was in a critical condition. I suggested section and a blood transfusion was done at the time of operation. Because of the presence of scar tissue in the abdomen and the fact that the omentum was more or less adherent to the uterus, the operation was a rather difficult one. Under local anesthesia a dead baby was extracted. In the fundus was a large amount of blood. That patient made an uneventful recovery.

DR. GEORGE KORNFELD.—I think the thing that should be emphasized is the terminology. The literature is full of all these terms. There is no definite terminology for the reason that there are so many degrees of placental separation, and, as I said before, we started with the mild, simple separation and ended with the complete separation.

The early diagnosis must be stressed.

In regard to the severe cases: it is in these cases that I think conservative treatment holds the most for us. Apropos of Dr. Gordon's remarks, I did not mean to rule out cesarean section entirely, but it is in the severe cases where there is rapid dilatation of the cervix, representing the real diagnosis of *ablatio placentae*, because the placenta seems to melt away, with complete separation, that rupture of the membranes and small doses of pituitrin given repeatedly, or the insertion of a bag, gives the best results. The mild cases can be left alone. In the sudden severe cases in this series nothing was done except as outlined.

DR. ONSLOW A. GORDON, JR., read a paper entitled **The Surgical Indication in Eclampsia.** (For original article see page 97.)

DISCUSSION

DR. ALFRED C. BECK.—I believe that the eclamptic patient is a poor surgical risk, and we do not like to interfere if we can avoid it. While the preeclamptic is a better surgical risk and can stand cesarean section, we do not subscribe to section as a treatment for preeclamptic toxemia. Where the patient is about to have convulsions we feel, of course, that her uterus should be emptied, but in our clinic a more conservative method is used; we usually resort to bags and as a general rule are able to deliver the patient before the onset of the convulsions. Occasionally, however, where we feel that we are dealing with a very fulminating case sometimes we will do a cesarean section, feeling that there will not be time enough between the diagnosis of preeclamptic toxemia and the actual delivery for the bag method.

We have used magnesium sulphate with good results and also bleed practically all our patients.

DR. RALPH M. BEACH.—I took the stand formerly that there were certain isolated cases of eclampsia that should be delivered by section, namely the primipara with the long undilated cervix. Today I admit that I was wrong and that now I do cesarean section very infrequently for eclampsia.

During the last three years we have had 30 cases of eclampsia in my service at the Methodist Episcopal Hospital. Of this number there have been two sections.

One case had a very markedly contracted pelvis, with a true conjugate of 8 or 8.5 and a marked funnel outlet. She came into the hospital in active labor, in eclampsia, and the indication was a double one, and section was done. The other section was in a primipara with eclampsia, and was treated conservatively. She had only two convulsions, but after thirty-six hours of labor she still was undilated. The indication for operation was cervical dystocia.

The only other argument refers to the preeclamptic state and whether these women should be sectioned. It seems a difficult matter to determine just how close a woman is to convulsions. In some cases we think they are in no danger and are surprised in a few hours to find that the patient is having convulsions. The cases we have sectioned have terminated well for both the mother and the baby.

Our routine in the eclampsia case today is to treat the woman simply for the eclampsia and wait for her to come out of the convulsive state. If she has come out of the convulsive state, is awake again, and does not go into labor by the end of two or three days, we generally induce labor.

In these three years we have done 19 sections for preeclampsia.

Latterly we have been using spinal anesthesia in practically all our cases. I think today we can probably do cesarean section for eclampsia more freely and with much better results than in the old days of general anesthesia. We analyzed the cases done under general anesthesia and our conclusions were that we made them worse; they developed postpartum pneumonia and that was one of the important contributing causes of the high mortality.

DR. JOHN O. POLAK.—I just want to offer a protest against the general use of spinal anesthesia in these cases. I think if we use local anesthesia we meet all the conditions that we have to meet. I agree entirely with Dr. Beach and with Dr. Gordon that with any general anesthetic you do exactly what you do not want to do. The ordinary CO_2 combining point is lowered, we disturb the sugar balance and these patients are bad surgical risks, not only from the standpoint of shock, but they stand trauma badly; they heal badly, many of them are edematous, and we have all the conditions which are bad for surgery. I am convinced that local anesthesia with previous morphinization meets the condition. After you have had a few deaths following the use of spinal anesthesia you do not feel so enthusiastic about it. I have had five "attacks" of spinal anesthesia. I have been very enthusiastic about it each time, and each time I have come exactly to the same end; some one has died who should not have died. When a patient starts to die under general anesthesia we can sometimes save her. With local anesthesia they do not have the same tendency to die, and I want, if possible, to avoid anything that is not foolproof, such as the death we had a little while ago from spinocain, which was one of the most interesting cases we had in a long time. The patient was in perfect physical condition and just because there was an error in bringing her in the wrong way she was tilted by coming up a little runway, an inclination of about four inches, and died immediately.

DR. CHARLES A. GORDON.—I think Dr. Gordon's best argument for cesarean section in preeclampsia is the welfare of the baby. Otherwise, I do not believe that there is a very good argument. Patients with eclampsia are notoriously poor surgical risks. Patients with preeclampsia are almost equally so. Cesarean section in eclampsia is universally condemned. At the British Congress of Obstetricians and Gynecologists in 1922, after a review of over 2,000 cases made by Eden, from Great Britain, Ireland and Scotland, the conclusion drawn was that cesarean section definitely impaired the chances of the woman for recovery. Section, I feel, has a very small place. Certainly there are mild and severe cases. Severe cases treated by mild, conservative measures, in all probability, will die. Mild cases, on the other hand, treated by severe methods will, in all probability, also die.

Schwarz and Dieckmann, noting the common association of diuresis with clinical improvement, have endeavored to bring that about, and use it as a good prognostic sign. Increased sugar tolerance of eclamptic women is probably due to chloride retention. Blood dilution with large amounts of intravenous dextrose bring about the effect produced by delivery, or death of the fetus.

Hendon's venoclysis is very promising and may prove to be even better than the admirable method of Titus. Hendon's only check on dextrose intravenously is the appearance of sugar in the urine.

Anesthesia, too, is far from settled. It is true that Stander has shown that all inhalation anesthetics produce a definite liver lesion similar to the lesion of eclampsia. Yet it is equally true that Stroganoff uses chloroform freely and repeatedly, and his results are not approached by anyone. Spinal anesthesia has great possibilities. It might well be that chloroform is bad, but the convulsions are worse.

It seems to me that some concerted effort should be made to carry out in this country the exact method of Stroganoff, just as Douglas Miller tried out the Dublin method in Scotland for five years after the Liverpool Congress.

DR. ONSLOW A. GORDON, JR.—First, I wish to emphasize that both Dr. Beck and Dr. Beach perhaps added confusion to what I expected to be a simple matter. There was no discussion concerning the advisability of section in eclampsia. I think we have all passed that stage long ago, and I did not presume to imply that we should give that point consideration. Therefore, let us consider one of the points that I tried to make, namely, the management of the preeclamptic patient. Dr. Beck suggests that in some preeclamptic patients bags and other methods of induction of labor are justifiable. I feel that that certainly is dangerous conservatism in an eclamptic or potentially eclamptic patient. Bags are uncertain in their action; they add the possibility of sepsis to these already devitalized tissues. As Dr. Beck himself suggested, a certain number of preeclamptic patients will surely develop convulsions. No one can say what group of preeclamptic patients will certainly develop convulsions and what group may get on without convulsions. It seems, therefore, best to assume, if the patient had been definitely determined to be preeclamptic, that it is not safe to continue with conservative measures after conservatism has had a certain trial in reducing the preeclamptic state or removing the patient from that state.

Dr. Beach emphasized the point which I think is very important, that these patients should have either a local or spinal anesthetic and that we have made a mistake—and now I am discussing preeclampsia—in the giving of general anesthetics in these cases.

I do not quite agree with Dr. Charles Gordon that the entire argument is for the baby in preeclampsia. I assume the opposite position, that the entire consideration is for the mother, but at the same time it greatly benefits the fetus and the patient is removed from the brink of imminent danger by the delivery of the fetus with as little traumatism and as little increase of the toxemia as possible, and that is possible by local or spinal anesthesia.

I have had no experience with sodium amytal.

BALTIMORE GYNECOLOGICAL AND OBSTETRICAL SOCIETY

STATED MEETING, OCTOBER 24, 1930

DR. GEORGE W. CORNER read a paper (by invitation) entitled **The Function of the Corpus Luteum**, of which an abstract follows:

Much of our current knowledge of the functions of the corpus luteum is based upon the work of Fraenkel, who showed that the ovary (and in particular, presumably, the corpus luteum) is responsible for successful implantation of the embryo; and also upon the studies of Ancel and Bouin, who demonstrated that the histologic changes which occur in the endometrium during the first days of pregnancy and following a fertilized ovulation are also dependent upon the presence of the corpus luteum. The recent work of the lecturer was begun by experiments designed to test and to combine the older observations. It was shown by experimentation on the rabbit that removal of the corpora lutea shortly after mating, at a time when the fertilized ova are on their way down the fallopian tube, prevents the progestational changes in the endometrium and thus leads to a failure of nourishment of the embryos when they reach the uterus, so that they are not implanted. Using such animals castrated on the first day of gestation, it has been possible to prepare extracts of the pig's corpora lutea which produce progestational alteration of the endometrium and thus enable the embryos of the castrated mother to survive in the uterus, to become implanted and even (if administration of the extracts be continued) to go on to birth at full term. Although the extracts have not been fully purified, it is obvious that the corpora lutea of the pig contain a substance (named "progestin" by the lecturer and his fellow-worker, W. M. Allen) which has the property of favoring gestation by acting upon the uterus so as to maintain the embryos. The well-known active substance of the graafian follicle and human placenta, first isolated by E. Allen and Doisy and known under various names, such as oestrin, folliculin, "the female sex hormone," etc., does not possess the power of producing progestational proliferation of the endometrium, but as predicted by Novak (and as demonstrated by Hisaw with regard to the relaxative hormone), the uterus must be under the influence of oestrin before it can respond to progestin. Extracts containing progestin have been shown by Weichert and by Goldstein and Tatelbaum to sensitize the uterus of the nonpregnant animal so that it responds to mechanical stimulus by the production of deciduomata similar to those produced in the well-known experiment of Loeb.

The chemistry of progestin is not yet understood. It is soluble in all lipid solvents, withstands fairly high temperatures and is not easily oxidized, but is very sensitive to alkalis.

Hisaw and his fellow-workers at the University of Wisconsin have isolated from the pig's corpus luteum another hormone named by them "relaxin," which has the power of producing relaxation of the symphysis pubis of the guinea pig similar to that normally occurring in this species during pregnancy.

In addition to these two effects there is a third reaction of the reproductive tract which may be ascribed to the corpus luteum, namely, mucification of the vaginal epithelium in rodents. The exact relation of this effect to the action of progestin and relaxin is not yet understood.

It has often been supposed that the corpus luteum acts to inhibit ovulation, but in the opinion of the lecturer this assumption remains unproved. Although numerous extracts have been described which possess the property of inhibiting the estrous

cycle of small rodents as tested by the vaginal smear method, these extracts have been made by such diverse methods that it seems possible that the effect in question is not specific.

The relation of the corpus luteum to growth of the mammary gland during pregnancy and to lactation remains to a large extent obscure. Slight changes of the mammary gland during the normal cycle and in the earlier weeks of pregnancy have been ascribed plausibly to action of the corpus luteum, but up to the present no one has demonstrated marked changes such as occur during pregnancy as a result of the administration of corpus luteum extracts. In Corner's hands highly potent preparations of progestin administered to nonpregnant animals have failed to alter the mammary glands. On the other hand, extreme growth of the mammary glands and lactation may be produced without difficulty in castrated rabbits by the injection of alkaline extracts of the anterior lobe of the hypophysis. It remains to be seen in what way the reproductive tract and the hypophysis are linked in the chain of events which leads to lactation.

The relation of the corpus luteum to menstruation, though not yet clear, will no doubt be worked out by an application of these new advances in ovarian endocrinology. Working with monkeys, Hisaw, Meyer, and Fevold have already shown that extracts containing progestin produce the so-called premenstrual changes of the endometrium. Their observations have been confirmed in unpublished experiments of the lecturer. It has already been known for some years as a result of the work of Corner, E. Allen, and Hartman that in monkeys menstruation frequently occurs without ovulation. In these cases the menstruating endometrium shows nothing of the so-called premenstrual change. As far as we can understand the matter at present, it seems probable therefore that the periodic recurrence of bleeding from the endometrium is not controlled directly by the corpus luteum. The function of the corpus luteum in the menstrual cycle is simply to produce the so-called premenstrual changes which are in normal cycles followed by bleeding.

In summary, the corpus luteum has been shown up to the present to produce two hormones, namely, the relaxin of Hisaw and his colleagues and the progestin of Corner and W. M. Allen. The action of these hormones is to produce certain changes in the reproductive tract which, in the first place, facilitate the nutrition and implantation of early embryos, and, in the second place, relax (in the guinea pig) the symphysis pubis, to facilitate parturition. In each case these effects are brought about as a result of the successive action of oestrin and the corpus luteum hormone.

ABSTRACT OF DISCUSSION

DR. CARL HARTMAN.—This presentation of the corpus luteum problem leaves one with diminished respect for biologic theory. Take, for example, the breast hormone. The cause of the gestational hypertrophy of the mammary glands has been generally taken to be the corpus luteum and in this conclusion morphology had the support of physiologic experiment. Thus the opossum was seen to have a tremendous and rapid growth of the mammary glands both in pregnancy and in pseudopregnancy with corpora lutea in the ovaries. Further, if a bitch lactates seventy days after ovulation in the absence of pregnancy one is certain to find fairly well-preserved corpora lutea present. Now, however, we find that the Corner-Allen luteal hormone, effective by the endometrial and the maintenance-of-pregnancy tests, has no effect on the growth of the mammae, while anterior lobe extract, even in the absence of the ovaries, is entirely effective in causing complete pregnancy hypertrophy of the mammary alveoli. Perhaps it may be found that lactation itself, i.e., actual secretion of milk, is under the same influence, for it certainly is not under the influence of the corpora lutea since these are often not present at

all during lactation. It is known, indeed, that cyclic changes in the ovaries inhibit milk secretion; hence the practice of veterinarians of spaying cows to make continuous milkers.

Another "accepted" function of the corpus luteum the speaker asks us to give up is that of inhibiting growth of the follicles and ovulation. This is not, we are told, specific for the corpus luteum, for other extracts have the same effect. I have myself long noticed that both in the monkey, at one end of the mammalian series, and in the opossum, our lowliest American mammal, lactation is quite sufficient, for long periods, to inhibit the ripening of follicles, though there be no signs of corpora lutea present in the more or less infantile ovaries.

Recently, too, we have had to strike from the list of luteal effects the decidual reaction of L. Loeb. This function, experimentally, has also been transferred to the anterior lobe.

The corpus luteum has likewise been removed from the center of the stage in the menstruation problem. It is to the credit of the gynecologist that the sequence of events in the menstrual cycle of women has been worked out and that on this basis the corpus luteum was eliminated as the active cause of menstruation. However, the substitute theory that menstruation was caused by the death of the egg and the degeneration of the corpus luteum was even worse and more sterile for real progress in the elucidation of the menstrual physiology. Dr. Corner first showed that periodic uterine bleeding may go on without ovulation; hence without corpora lutea. We have in the Carnegie monkey colony gone a step further and followed his example by locating, as we think we have done, the origin of uterine bleeding in the anterior lobe. What a worshipful gland the hypophysis, once the seat of the soul, is getting to be!

DR. EMIL NOVAK.—The demonstration, by Dr. Corner and Dr. Allen, of the active principle of the corpus luteum is a contribution of first importance to our knowledge of the physiology of the human cycle, filling out a gap which many of us have long felt must exist. It deals a final blow to the concept of a single "female sex hormone." Whether progestin will prove of value therapeutically it is too early to say, though it is rational to expect that it will. The most valuable indication for its use, it seems to me, will be in the treatment of functional hemorrhages, in which there is characteristically an absence of corpora lutea in the ovaries, and, presumably of progestin in the circulation. It may be of value also in the management of those cases of amenorrhea in which treatment is indicated. Unfortunately, its effect, like that of the follicle hormone, is purely a substitutional one, so that this method of treatment may still be unsatisfactory. There is more reason to expect good results from treatment with anterior pituitary principles, when these are made available, for these may be expected to exert a genuinely activating influence upon ovarian function.

DR. A. C. TIEMEYER read a paper entitled **Placenta Accreta**. (For original article see page 106.)

ABSTRACT OF DISCUSSION

DR. J. WHITRIDGE WILLIAMS.—Dr. Tiemeyer's case represents the only one of the kind which I have had an opportunity to study. So far as I recollect, I have only made such a diagnosis in one patient, who refused operative interference and I do not know what became of her.

The only criticism I can make in reference to the case is the statement that the condition is due to the defective formation of decidua, which in this instance was attributed to the course of her previous labors. Naturally, this offers the simplest explanation for the abnormality, but I am not sure whether it is always correct

My reason for this statement is that in my histologic studies of pregnant uteri with the placenta in situ, I have found the greatest possible variation in the behavior of the decidua basalis; and in the same uterus areas may be found with a relatively thick decidua, while in others it is almost entirely absent. In such areas all trace of a spongy layer has disappeared.

DR. I. A. SIEGEL presented a paper entitled **Placenta Previa**. (For original article see page 110.)

ABSTRACT OF DISCUSSION

DR. LOUIS H. DOUGLASS.—There are several points which I feel should be emphasized more strongly:

First.—The ease of making a diagnosis of placenta previa and the importance of an early diagnosis. These cases must be seen and treated early, but it would seem as if there were something wrong with our teaching of the subject in this connection. The pregnant woman fears hemorrhage and will almost invariably notify her doctor as soon as she starts to bleed, no matter how slight the amount may be. In spite of this, patients are brought into the hospital after they have bled two, three, or four times and when admitted are in extremis. These cases have been seen by their doctors who know they have been bleeding and yet delay in recommending admission to a hospital.

Second.—The incidence of placenta previa among the white and colored patients. Among the 115 cases, 77 were white and 38 colored, which is an incidence of 2 to 1, but when we remember that our clinic is about 80 per cent colored this gives us an actual incidence of 8 to 1. If we accept the usual etiologic factors, we should find them much more prevalent in the colored than in the white. I have no explanation to offer for this and am merely presenting it, hoping that some one will be able to explain.

DR. J. M. H. ROWLAND.—I am very enthusiastic about cesarean section in all cases of placenta previa, except for the marginal variety. Under certain circumstances, even these, i.e., cases with undilated cervixes and women not in labor with considerable bleeding, should be subjected to section.

Department of Maternal Welfare

CONDUCTED BY FRED L. ADAIR, M.D., CHICAGO, ILL.

AN ANALYSIS OF OBSTETRIC WORK DONE IN ESSEX COUNTY, N. J., HOSPITALS FOR THE YEARS 1927-28-29

BY CARL H. ILL, M.D., NEWARK, N. J.

THE Maternal Welfare Commission of the Essex County Medical Society was organized in May, 1923. It was organized by the Essex County Medical Society to try to better the obstetric mortality and morbidity of this section. One of the

FIG. 1.—STANDARD OBSTETRICAL RECORD

Name			Date Admission
Case No.	Boy	Girl	Date Birth
Race	Alive	Stillbirth	Abnormality
Remarks:			
Position	Toxemia	Prematurity	
Forceps	Eclampsia	Laceration	
Caesarean	Placenta Previa	Sutures	
Version	Hemorrhage	Infection	
Remarks:			
Condition of mother on discharge			
Condition of child on discharge			
Date	Signed		

TABLE I. TOTAL NUMBER OF CASES IN ALL NEWARK HOSPITALS FOR THREE YEARS

	1927	1928	1929
Total number of cases	6257	6307	8621
Alive	5965	6099	8224
Stillbirths	205	219	310
Twins	31	51	58
Head presentation	5817	5921	7191
Breech	212	246	217
Forceps	602	588	1173
Version	72	56	100
Toxemia	71	52	106
Eclampsia	25	35	32
Placenta previa	52	47	40
Hemorrhage	93	66	115
Infection	74	40	35
Laceration	1339	1416	2330
Cesarean sections	124	106	167
Baby deaths	10	11	7
Mothers deaths	11	8	11
Baby deaths	168	183	196
Mothers deaths	36	34	44

TABLE II

HOSPITALS	A	B	C	D	E	F	G	H	I	J	K	L	M	TOTAL
TOTAL NO. CASES	1618	465	3187	1569	1472	2386	975	530	363	4290	1137	2604	589	21,185
Stillbirths	258 42	378 14	31 102	205 33	381 62	388 95	297 29	377 20	03 14	479 205	237 27	317 83	135 8	34 734
Twins	996 16	00043 2	080 26	096 15	057 10	103 27	041 4	037 2	02 7	0301 14	096 11	060 22	135 8	06 140
Breech	407 66	372 16	379 118	288 45	263 38	314 80	223 22	224 12	045 15	288 118	336 38	393 103	067 4	32 675
Forceps	507 55	477 18	285 914	14 216	107 172	192 530	747 73	995 53	04 15	123 53	941 73	449 117	865 51	109 2363
Version	039 6	461 20	091 20	043 12	089 15	181 43	102 10	055 3	01 7	1606 68	106 12	045 12	0	10 228
Toxemia	046 8	00021 1	124 40	083 8	093 19	125 28	010 1	185 10	0	1664 73	284 32	035 9	0	10 220
Eclampsia	086 6	00021 1	041 13	059 9	011 3	016 24	010 1	018 1	0	0525 23	044 5	023 6	0	04 92
Placenta previa	031 5	253 14	039 13	013 2	110 9	155 32	060 6	037 2	005 2	0898 38	0434 5	027 7	067 4	063 139
Hemorrhage	081 13	089 2	003 1	085 15	015 4	074 14	1212 119	037 2	01 5	0062 3	0875 10	314 83	051 3	12 274
Infection	021 3	00021 1	009 4	085 15	020 3	0565 10	020 2	132 7	01 4	0470 20	512 58	085 22	0	07 149
Cesarean section	149 24	092 2	172 56	565 87	499 81	115 28	92 9	224 12	01 4	0939 39	332 40	057 15	0	18 397
Baby deaths	25 6	0	18 1	23 2	99 8	140 4	0	0	0	77 3	75 3	66 1		723 28
Mothers deaths	41 1	0	536 3	92 8	61 5	180 5	0	0	0	155 6	50 2	0	0	76 30
Baby deaths	146 24	235 7	296 94	180 30	230 26	1023 33	387 38	055 3	01 6	490 208	254 29	188 49	0	27 572
Mothers deaths	018 3	00021 1	046 15	052 8	055 8	029 8	031 3	129 7	008 3	129 54	0352 4	018 5		05 119

functions was a survey of all the hospitals doing obstetrics in the county and analysing their reports. In order to get uniform records a standard chart was developed and has now been adopted by all the hospitals (Fig. 1). These records are very simple and were purposely kept so, because we realized that by going into too great detail we would not have nearly as accurate data. Before this work was undertaken hardly any of the hospitals had any idea of what work they were doing and rarely summarized their work for the year.

Each hospital fills out a card for each delivery (Fig. 1), which contains all the information that we use for the annual report from the institution and all that the historian has to do is total the cases and send them in to the Committee. Each year we have less and less trouble getting the report, and although these figures are not entirely complete we feel we have enough to make it worth while to publish them. It must be remembered that in Essex County there are no teaching institutions and by far the greater amount of obstetrics is done by general practitioners.

Table I shows the total work done for the three years. The total for the year 1929 is larger because for the first time we have the entire number of cases of all but one hospital which has failed to cooperate with us.

TABLE III. INDICATIONS FOR CESAREAN SECTION IN 397 CASES

Disproportion (pelvis and head)	141
Former cesarean section	23
Toxemia	11
Eclampsia	14
Unprogressive labor	34
Premature separation of placenta	6
Placenta previa	19
Breech	9
Heart disease	9
Ruptured uterus	4
Hypertension	5
Fibroids obstructing labor	3
Face presentation	3
Cardiac disease with pulmonary tuberculosis	1
Stenosis of cervix	1
Neurosis, a former complete repair	1
High amputation cervix, left phlebitis	1
Atresia	3
Hypertension, former prolonged labor with stillbirth	1
Transverse position, former stillbirth	1
Malposition of fetus	2
Ankylosis of hip	1
Previous difficult labor, severe laceration	1
Glycosuria	1
Laceration of vagina and broad ligament	1
Difficult labor, in 11 out of 13 pregnancies	1
Uterine sepsis	1
Aged primipara, prolonged labor	1
Premature ruptured membranes	1
Not given	97

Table II shows the work done in the individual hospitals for the three year period. I tried to get a differentiation between Ward and Private cases, but as several hospitals included their semiprivate with their ward cases I could not use these figures. As a whole, however, the more ward work done the better the statistics of the hospital.

The number of breech cases was fairly constant in the different hospitals; ranging from 4.07 to 0.67 per cent, with an average of 3.2 per cent.

The use of forceps varied very greatly from 28.5 per cent to 0.4 per cent with

a general average of 10.9 per cent. These of course, included all the low forceps cases, which everywhere constituted the largest number.

Versions also were quite evenly divided; ranging from 4.61 per cent to 0 per cent, with an average of 1.90.

Toxemias were likewise evenly distributed. Although every hospital seemed to have a different conception of just what to report as a toxemia. Some reported every rise in blood pressure over 160, others only those with definite toxic symptoms but no convulsions. We are endeavoring to standardize this.

TABLE IV. CESAREAN DEATHS

Sepsis	11
Placenta previa	1
Ruptured uterus	1
Pulmonary embolism	1
Cerebral embolism	1
Shock	3
Eclampsia	4
Toxemia	2
Cardiac insufficiency	3
Fractured vertebrae	1
General sarcomatosis	1
To save baby	1

Eclampsia ran very even through all the hospitals with a high percentage of 1.25 per cent to 0 per cent, and an average of 0.4 per cent. The same applies to placenta previa.

Cesarean section shows the most interesting differences. The number was 397, or 1.8 per cent of all cases and varied from 0.190 to 5.65 per cent in the various hospitals. The babies that died following cesarean were 28, or 7.23 per cent. This ranged

TABLE V. CAUSES OF MATERNAL DEATHS, 41¹

Toxemia	4
Eclampsia	4
Shock and inverted uterus	1
Pneumonia	5
Pernicious anemia	1
Pyelitis, phlebitis, double pneumonia	1
Hepatic toxemia with terminal bronchial pneumonia	1
Acute dilatation of heart	2
Tuberculosis with heart complications	1
Streptococcus blood stream infection	1
Pleurisy, heart failure	1
Cardiac, toxic	1
Shock, difficult delivery, toxic	1
Fulmination, pulmonary tuberculosis	1
Nephritis, eclampsia	1
Postpartum hemorrhage	2
Phlegmonous gastritis	1
Pulmonary embolism	1
Puerperal sepsis	2
General peritonitis	2
Uterine bleeding, anemia	1
Shock, hemorrhage	1
Embolus	1
Meningitis	1
Carbuncle on lip, streptococcus infection	1
Eclampsia, edema of lungs	1
Bronchial pneumonia	1

¹This list does not include deaths from cesarean section which occurred in the Newark City Hospital.

from 25 per cent to 0 per cent. Thirty mothers died, 7.6 per cent, ranging from 18 per cent to 0 per cent.

During these three years 572, or 2.7 per cent babies died before they left the hospital. This included all the prematures, and as there were 734 stillbirths this gives a grand total of 1306; about 6 per cent of all mothers entering the hospitals went home without their babies. The baby deaths ranged from 4.90 per cent to 0.10 per cent.

The maternal deaths were 119 or 0.5 per cent, the highest rate being 1.29 per cent; the lowest 0.0021 per cent.

The indications for cesarean section are given in Table III. By far the larger part are classified under disproportion. This included all flat pelves, small pelves and large babies in a rather small pelvis. There were 14 cases in which cesarean was done for eclampsia, with four deaths, or 2.8 per cent, which is rather high. There were 80 cases of eclampsia treated without operation with 11 deaths or 1.3 per cent. There were 19 patients with placenta previa operated upon with 1 death or 5.2 per cent, against 6 deaths out of 139 nonoperated cases or 4.3 per cent. There were 11 toxemia cases sectioned with 2 deaths or 18.2 per cent, against 2 deaths in 229 cases conservatively treated or slightly less than 1 per cent.

Table V shows the maternal deaths in this series. If we omit the 30 cesarean deaths we have 89 cases left. Eighteen died from some cause not related to the pregnancy, which leaves 71 deaths due to some accident of pregnancy. This corrected mortality, leaving out the cesarean sections, gives 63 deaths out of 20,788 cases not sectioned, or a rate of 0.3 per cent.

In analyzing again the total of 119 deaths, we find 25 due to causes which are nonobstetric. This gives a corrected mortality of 0.4 per cent.

Another very interesting fact is that if we leave out the Newark City Hospital deaths, where most of the neglected cases are sent, we have 65 deaths in all the other hospitals; of which 24 were due to cesarean sections, or almost 40 per cent.

188 CLINTON AVENUE.

Correspondence

THE ABORTION PROBLEM IN RUSSIA

To the Editor.—A two weeks' visit to Russia last summer gave me an opportunity of studying at first hand the revolutionary doctrines concerning legalized abortion about which I had been reading for some years. Russian medical literature has been filled with reports from innumerable clinics giving figures and more figures. What I wanted to know was how the thing actually worked. I shall therefore refer only very briefly in this article to the statistical side as presented by the government officials and rather stress the things that I saw and heard and, as nearly as I can depict them, the conditions under which they occurred.

I prepared myself for the trip by obtaining several letters of introduction to government health officials, and by a conference, secured through the kindness of Dr. R. L. Dickinson, with Dr. Cheftel, the New York representative of the Russian Department of Health. The numerous changes that were just at that time being made in the personnel of the department, presented certain difficulties. While it was necessary often to do some waiting around, no obstacles were placed in my way and I could see whatever I asked for.

My itinerary was as follows: Entering Russia from Finland July 12, 1930, I spent four days in Leningrad, then went to Moscow for eight days and finally spent a little over a day in Kiev before leaving via Poland and Rumania for Constantinople. I found my knowledge of German very valuable and most of my conversations were carried out in that language, although occasionally I had recourse to a Russian interpreter.

The first twenty-four hours in Leningrad made me realize that Russia was still in the throes of a revolution. The delapidated, unpainted buildings in the Nevsky Prospect, the dirty, ill-smelling marble stairway of the Hotel de l'Europe, the upturned paving everywhere in the streets, the endless lines of people, waiting, waiting for their turn in the food lines; men and women swarming along the streets or hanging at a dangerous angle from the platform of the crowded street cars; all made you realize that the thirteen years that had elapsed under Soviet rule had not sufficed to put the socialist doctrines on an organized efficient basis. My visit to the von Ott Maternity, at one time considered the finest in Europe, was particularly enlightening in this regard. I had made an appointment with charming old Professor S—, for many years its director, who has an apartment on the top floor of the building for the resident staff. He is consultant in eclampsia, but otherwise has no longer any official position in the maternity. Apparently he had never received the letter I had written him from America. After a short conversation in his rooms on the subject of eclampsia, I asked to see the Maternity. He told me that it was completely shut down for two months for repairs and all patients were being handled in other institutions. As a matter of fact the repairs were minor ones, such as painting and a little plastering and carpenter work. Dr. S— graciously led the way across the court to the maternity entrance where stood a Soviet guard. He explained that he wished to show the building to a foreign visitor and we were permitted to enter. To the left of the corridor was the office and as we entered, two women were seen sitting at desks working over some papers. As the professor approached and asked a question, neither showed him the slightest respect or interest but nodded toward the door of the next room where the janitor and two men were seated about a table doing nothing. I surmise that Professor S— was asking

for some one to open the doors of the various rooms so that he might show me the building. For a few moments the professor's voice was raised in irritation when his request was refused. He returned to the office and opened the door of a little closet in which hung 40 or 50 keys. None were labeled or numbered, so after picking up one or two for signs of identification, he shrugged his shoulders and turned apologetically to me, saying that he would not be able to show me as much as he would like. Then followed a parade through corridors past barred doors with here and there a workman or two spraying plaster on the walls. To relieve his embarrassment, I pleaded another appointment and made my departure, thanking him for his courtesy.

In Leningrad after a conference with some of the officials of the local Narkomsdrav (Health Department), I visited the Institute for Mother and Child. From the health officials I learned that physicians have an income of from 150 to 500 rubles a month (\$75 to \$250) for their government work which takes usually about four hours a day. At other times they may have private patients but a graduated government income tax starting at 10 per cent on 1000 rubles, 25 per cent for 2500 rubles, etc., is a damper to any enthusiasm to build up a practice. The Institute for Mother and Child was a collection of old buildings of none too prepossessing appearance with a capacity of 720 beds, of which 220 were for the unmarried or deserted mothers. These outcasts were well cared for and for the year after the birth of their children, while they were nursing, they were sheltered and taught some way of making a livelihood. Whenever the name of the father was given, he was compelled to pay one-third of his income for the support of the child. Special courses for the training of physicians and nurses were given at this Institute, and according to the officials in charge, the sum of 75,000 rubles was appropriated for research work there. The milk preparation station, a two-story, well-equipped building, was in contrast to the shabbiness of the remainder of the Institute. There were no screens and the flies buzzed in numbers around the cribs of the premature children, who seemed to be surviving in spite of them.

Moscow was much cleaner and better organized than Leningrad. Shortly after my arrival I had conferences with Dr. Ettinger, Assistant Commissioner of Health and with Dr. A. B. Genss, who is the official statistician and has effectively organized the investigations concerning abortion and contraception. The every-fifth-day holiday system, together with the usual delays of Russian officialdom, made it somewhat complicated to meet the various persons I wished to see. In a long talk with Dr. Genss and Dr. Ettinger I obtained much information on the Russian situation. It was, however, very difficult to learn how much of this were plans on paper and how much was actually in operation. There are four general courses of instruction in the medical schools: (1) general medicine, duration four and one-half years; (2) sanitary prophylaxis (public health, sanitation, infectious diseases), duration four years; (3) maternal and infant welfare (obstetrics, gynecology, and pediatrics), duration three and one-half to four years; (4) dentistry, duration three to three and one-half years. During the summer months the student serves as assistant to some doctor in the country districts. To get a university position, requires three years' hospital training for an assistant, seven years for an instructor, and special ability and research work to become professor. The children of workers are given preference to all others as students and a special three years' premedical course arranged for them. Of interest was the fact that at present about 50 per cent of the medical students are women. New schools are being established rapidly. Three new ones were begun in 1930 (one in Nijni-Novgorod and two in Siberia). Ninety per cent of the students pay nothing for education, get a room and a small stipend from the state.

Dr. Genss dwelt on the intensive work in investigating various methods for preventing conception. Every suggestion was given a trial, even those recommended by

charlatans. A small soft rubber ball filled with a gas, which expanded when the ball was placed in the vagina and so shut off the upper vagina, was being used in some cases. The Kafki metal pessary was found especially useful in cases of anteversion. The Mensinga type pessary was used in cases of first degree retroversion and in cases of complete retroversion no pessary but contraceptive pastes were alone employed. Numerous birth control clinics were established all over Russia but the cost of contraceptive measures made it impossible for the masses to employ them with any degree of completeness, and hence it was felt that for a considerable period of time abortion would have to be employed to limit the size of families.

Similarly, various methods for inducing abortion beside the usual curettage, were given a trial. The paste employed with reputed success, as intrauterine injection and devised by a German druggist named Heiser, had been used in 55 cases. The injection of 5 per cent tincture of iodine in the uterus was done in one series. At regular intervals a conference is held by the group of physicians in charge of these abortion clinics and the results of treatment discussed and recommendations made. Thus the conference had voted against the temporary sterilization with x-ray and the use of 5 per cent iodine and had decided that surgical sterilization, unless done in association with other operative procedures, should only be performed after a consultation by 3 physicians. It should be limited to mothers, over the age of thirty-five years, who had 3 or more children.

The astounding reports on the absence of mortality after abortions were of course well known to me and I was glad to get a chance to question Dr. Genss more closely on this subject. He stated that no deaths could be directly attributed to 201,480 abortions, done in the Moscow district in 1927, but with this "alibi": Two women had died, one from a gonococcus infection that had been overlooked at the time of the abortion, and the other from a streptococcus infection communicated through the sperma of the husband, for such streptococci were later found in the husband's sperma. I leave it for the reader to draw his own inferences, as to whether a zero per cent mortality is justified under such circumstances.

I was most anxious of course to see things at first hand and so looked forward to the next day when I was to visit one of the large abortaria in the Arbat district of Moscow. There were two of these in Moscow, each with a capacity of about 250 beds and devoted solely to the handling of the induced abortion cases. The diagnosis and operative indications were made in dispensary rooms on the first floor. No Aschheim-Zondek tests were ever employed. Cases were selected with some care and while the general understanding was that any woman who desired an abortion could have it done, three groups of cases were eliminated or reduced to a minimum: (1) primiparae, who could give no valid reason why they should not have at least one child, (2) women, who had passed the third month of gestation and were therefore more apt to get hemorrhage or a perforation, (3) women, who gave evidence of an active cervical infection. In the last named group an attempt to cure the infection was made and, if successful, abortion was done later. In the more advanced pregnancies medical indications were usually required to justify induction of abortion. The physician or anyone else, who accepts pay for the abortion, is of course punished by imprisonment. In the first years the state made no charge for such abortions but in order to secure hospital facilities and equipment to take care of the thousands who asked for interference, it became necessary to distinguish between those who could pay something and those who were penniless. The abortion commission that formerly was concerned to some degree with indications, now confines its work to determining whether the patient's economic conditions justifies a free operation. Only 20 to 30 per cent of the cases are free. The remainder must pay a fixed fee calculated on 25 per cent of the joint average income of the family. Thus if the husband earns 150 rubles a month and the wife earns

50 rubles a month and there are 3 children, the charge for the abortion would be 25 per cent of 200 divided by five, or 10 rubles, the equivalent of five dollars.

The Moscow Abortarium was a rather dingy 3-storied building, one division of which was devoted to the free cases and the other to the pay cases. Each division had its own operating room, the better one being for the free cases. In this room, approximately 15 by 20 feet, were two ordinary treatment tables. I arrived at 11:30 in the morning accompanied by 4 other American physicians who were visiting in Moscow at the time. We were greeted by Dr. Moschudinski who was expecting us. The morning's work had already begun. In the free operating room two patients were being curetted, one by a man and the other by a woman physician. The patient lay in the lithotomy position clothed merely in a hospital jacket and without any special drapes. On the table to one side lay the instruments, spread out on a sterile tray, consisting of a Sims speculum, two tenaculum forceps, a set of graduated Hegar dilators, two large open curettes, one sharp and one dull, the loop measuring 3 cm. long and 1.2 cm. wide, a dressing forceps, and a wooden stick applicator covered with alcohol-soaked cotton. A small number of gauze sponges were available but not often used. A single pair of rubber gloves was divided between the operator and his nurse assistant, in each case the ungloved hand being kept as far as possible from direct contact with the instruments used in curetting.

When we entered the room, both operations were in progress and blood was flowing freely, though without unusual hemorrhage, as with long sweeps the curette brought away pieces of placenta and ovisac. There was scarcely a groan from either of the patients throughout the procedure and with a surprising speed it was completed and the patient lifted on a stretcher and taken away to make room for the next one. After watching about 6 operations here, we proceeded to the private operating room where we stayed a longer time. Dr. Moschudinski did none of the operations himself, but stood ready to answer any questions and show us what we wanted to see. He said that patients were admitted the evening before at 5:00 P.M. when the urine was tested and the cervix examined for evidence of gonorrhea. The patient was given a bath and enema, and the vulva shaved. The following morning without any preliminary medication of any sort and without any anesthesia, the patient got up on the operating table, was placed in position and the external genitals scrubbed with tincture of soap for one to two minutes, followed by a lysoform vaginal douche. Then sterile stockings were slipped on. The operator and nurse were in the meanwhile scrubbing their hands for about three minutes. No gowns or sterile dressings were employed, only a towel slipped under the hips just before beginning the operation. A Sims speculum was then introduced and the cervix caught with a tenaculum forceps. The nurse held these instruments, while the operator wiped out the vagina with lysoform or bichloride solution and then took the wooden applicator soaked in alcohol to clean the cervix. Dilatation of the cervix with graduated Hegar instruments was begun, the gloved finger being in each case held at a point on the dilator to prevent perforation of the uterus. Dilatation proceeded until the large Recamier curette could be introduced and curettement begun, first for several minutes with the blunt curette and then for a shorter time with the sharper one. As a rule the operator before beginning assured himself of the exact size of the uterus by a bimanual examination. All of the women whom we saw operated upon that morning were multiparae, although Dr. Moschudinski told us that one of the women operated upon before our arrival had not before been pregnant.

As to anesthesia, we were told that both to diminish the risk of bleeding and because of the expense, it was employed in less than 1 per cent of the cases. Since only about 5 per cent of the women aborted were primiparae, necessity for narcosis was reduced. Nevertheless there was ample evidence of severe suffering by many of the women in the process of dilating the cervix and their groans sent shivers

down our backs. However, the ability of the Slavic people patiently to endure pain was amply shown by the way these women would cheerfully respond to Dr. Maschudinski's question and say that it wasn't so bad. Some few even smiled as they slid over from the table onto the stretcher and were taken away.

The morning that we visited the abortarium of Dr. Moschudinski there were done 57 abortions, of which number 20 were done in the free clinic and 37 were done in the pay clinic. The operative work began at 10:30 A.M. and was finished by 1 P.M. We actually saw during the time of our stay between 20 and 25 of these abortions. The speed with which this work is done can best be seen when we figure that in the one hundred and fifty minutes operating time with four tables being used (two in each room), it would allow for the 57 operations that morning, a trifle over ten minutes for each procedure. These ten minutes were consumed as one minute getting on and off the table, three minutes preparation, and six minutes of actual curettement. That a considerable amount of skill and clockwork efficiency was demonstrated cannot be gainsaid.

Even more interesting was our subsequent visit to the postabortion wards. Every bed was taken in these overcrowded rooms (14 beds to a room that should hold only 7 or 8 at the most). The only empty ward was the one that had been occupied by the patients leaving that day, the bedding of which was being aired for those who were to enter that evening. Stolid indifference characterized the faces of most of the women, although to please Dr. Moschudinski, some of them would laugh and say they felt fine. Only an occasional face showed a pallor indicative of a severer blood loss and none seemed to have fever. I asked to see the patients' charts and looked over 30 to 40 of them without finding more than 3 elevations of temperature up to 38° C., all of them subsiding with the passage of clots and tissue in twenty-four hours. In the septic room containing 3 beds there was but one patient. Her highest temperature was 38.5° C., and she did not seem to be very sick. This abortarium was one of the few hospitals I saw in Russia with screened windows. The patients were allowed to sit up on the second day, walk on the third day, and leave the hospital on the fourth day after operation. The total stay in the hospital in Moscow, therefore, was five days. In less well-equipped cities such as Kiev the stay had to be limited to three days owing to the small number of available beds.

Dr. Moschudinski then showed us a small laboratory where urine tests were made. He told us that out of about 20,000 abortions done in the past year at his abortarium there were two cases of extrauterine pregnancy and only 3 or 4 perforations. All of the patients had been operated upon by Dr. Moschudinski without a death. They did not permit induction of abortion after the third month except in very rare instances and consider that at six to eight weeks the operation is less complicated than during the first month. The total number of legalized abortions in Moscow can be figured as 40,000 annually, or 20,000 for each abortarium. This corresponded exactly with the record of our day's visit: $57 \times 360 \text{ days} = 20,520$.

An interesting side light on the abortion question was obtained by my visit to Kiev, where I had a very satisfactory conference one evening with Professor Wittenberg. At his home, where he most courteously received me and my family, he told me of his work with a frank sincerity that was quite convincing. He said that he, like most of his colleagues, had at first been very skeptical of legalized abortion, but that the experiences, especially of the last few years, convinced him that, at least for Russia, it was the lesser of two evils and should be continued. In Kiev there were in 1929 over 8,000 abortions, in 1930 about 10,000. Many women from neighboring villages came to Kiev to have the abortion done under better hospital conditions. Compared with fifteen years ago when abortions were done secretly by midwives and charlatans, there was a marked drop in the number of febrile abortions. In his service at the university, Professor Wittenberg had 15 beds in gynecology, 15 beds in obstetrics, and 25 beds for abortion cases. Out of the

5,000 abortions done in two and one-half years in his service there were no deaths, one perforation with intestinal injury requiring operation, and two other perforations not requiring operation. Owing to limited bed capacity patients were admitted in the morning and operated upon the same day, remaining only forty-eight to seventy-two hours after operation. In place of narcosis psychotherapy was often attempted by telling the patient that a given local application would relieve the pain. Expense of cocaine and anesthetics made this necessary. In Professor Wittenberg's clinic the charges for abortion were as in Moscow, but there was only one free bed out of the twenty-five. The total abortion beds in Kiev were 75.

The operative technic in Kiev was as follows: Shave, scrub with soap, give 1-4000 formalin vaginal douche, apply tincture of iodine to cervix, dilate to No. 10 for two months' gestation and to No. 14 for three months' gestation, curette with large, sharp Recamier curette and use a soft placental forceps like our sponge holders to clean out the cavity. This was followed by an intrauterine irrigation of 1-4000 formalin solution with a Bozeman irrigator. Up to last year a cervicovaginal tampon was used but recently only in cases of severe bleeding, and not longer than six or eight hours.

I asked Professor Wittenberg about readmissions for incomplete procedures. He stated that there had been about 25 such cases in the past year and that less than 1 per cent ran a febrile course. In my interview with Professor Braude of Moscow I also heard something of these readmissions after curettage. Professor Braude, a former assistant of Professor Strassman of Berlin, is editor of the leading journal on obstetrics and gynecology in Russia and head of the second Moscow University Clinic. He sees nothing of legalized abortions now and was hence unwilling to talk freely. He did not deny, however, that a certain percentage of abortions developed complications after they left the abortarium, and that readmissions for infection occurred from time to time.

As I read between the lines from these experiences the reports of various Russian clinics, there seems no question that the maternal mortality and morbidity is less with legalized abortion than it was with secret abortions before the war, but this mortality does not reach the zero percentage claimed by some officials. More and more, however, we find evidence in Russian literature of the harmful psychic effects, gynecologic lesions and secondary sterility coming as an aftermath to these procedures, so that a movement to restrict legal abortions is again gaining ground.

Both Professor Braude and Professor Wittenberg were deeply interested in the work of American gynecologists and hoped at some time to be able to see this country. They longed for the time when America would send out the call for the long-postponed International Congress of Gynecology and Obstetrics. Sixteen years have elapsed and no one has seen fit to make the first move. Our Russian colleagues are eager for the friendships and stimulation that such a Congress would bring.

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Department of Book Reviews

CONDUCTED BY ROBERT T. FRANK, M.D., NEW YORK

Review of New Books

Prof. Ludwig Nürnberger of Halle a.S. has written the second half of the fifth volume in Stoeckel's *Handbuch der Gynäkologie*.¹ The entire volume of 788 pages deals with the diseases of the vagina. Hence it is extremely detailed and covers a large amount of casuistic and literature, with a fair degree of uniformity although the American literature has not been scanned as closely as that of European countries.

Glycogen is found in the vaginal epithelium of the fetus. The great absorptive power of the vagina is emphasized and poisoning occurring through this portal of entry is discussed in detail. Nürnberger disagrees largely with Dierks and others in that he finds no definite change in the vaginal mucosa ascribable to the cycle. However, in pregnancy and labor distinct differences in the epithelium are noted. Stieve's important work on the pregnancy changes in the connective tissue in the pelvis, as well as in the musculature, are fully described.

A large amount of space is devoted to the vaginal flora, including its bacteriology, the difference between the child, adult, and senile individual, the hydrogen-ion concentration and the metabolism. Fluor is divided into tubular, uterine, cervical and vaginal. The author does not agree with Schroeder's theory in which so much of the bacterial changes are ascribed to the variation in glycogen content of the epithelium. He agrees more with Niderche, v. Jaschke and Menge. The self-cleansing of the vagina and elimination of pathogenic bacteria is featured. Moreover, vestibular neurogenic and psychogenic fluor is stressed. Much importance is placed upon the diagnosis of the origin of fluor and although local treatment is fully described, general measures are greatly emphasized. Under inflammations every phase is fully discussed. An excellent description of colpitis emphysematosa as well as a full discussion of *Trichomonas vaginalis* will be found in these pages. Other main topics are syphilis, ulcer molle, injuries, and ulcers. Tumors of the vagina are described. A very excellent description of sarcoma botryoides in children is given. Among diffuse adenoma of the vagina, I notice that Plaut's case is omitted. A large amount of space is devoted to adenomyoma as well as to carcinoma.

This book will be found to contain a complete description of conditions of the vagina, except that some of the world's literature has been omitted. If anything, the text has been kept somewhat too impersonal and is strictly along conventional lines. This volume contains 271 beautiful illustrations, many of them in color, the great majority of which are from other sources to whom due credit has been given.

—Robert T. Frank.

¹*Handbuch der Gynäkologie. Dritte Auflage.* W. Stoeckel. Fünfter Band. Zweite Hälfte. Die Erkrankungen der Scheide. Bearbeitet von Dr. Ludwig Nürnberger. J. F. Bergmann, München, 1930.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

THE OBSTETRIC LITERATURE OF 1930

By J. P. GREENHILL, B.S., M.D., F.A.C.S., CHICAGO, ILL.

IN GENERAL the obstetric literature of 1930 has been similar to that of previous years but special attention has been focused upon certain subjects. The number of papers devoted to various tests for detecting early pregnancy has increased enormously. Most of these articles deal with the Aschheim-Zondek test and a large proportion of them prove the reliability and usefulness of this test in the detection not only of early pregnancy but also of hydatidiform mole and chorion-epithelioma. A number of papers are devoted to a discussion of chorionepithelioma and some emphasize the value of radiation for the treatment of this malignant condition. A large share of the literature is devoted to medical complications in gestation. This indicates the increased recognition of the necessity of inviting the cooperation of medical consultants in the care of pregnant women. There is renewed interest in oxytocics and this is due to the increasing use of thy-mophysin to shorten labor. Local anesthesia is finding more and more favor in obstetrics especially for the delivery of women who have toxemia of pregnancy and other complications.

PREGNANCY

Physiology.—According to K. Ogino,¹ conception in the human is impossible between the first and the eleventh days of the menstrual cycle and is almost limited to the period which extends from the twelfth to the nineteenth day. F. Wittenbeck² on the other hand, denies this and reports cases which prove that pregnancy may take place before the eleventh and after the nineteenth day. (H. Knaus³ agrees with Ogino and has done a good deal of experimental work in the attempt to prove his point. Theoretically a woman is capable of conceiving only for a short period after ovulation; that is some time between the twelfth and nineteenth days of the menstrual cycle. Since an ovum is capable of fertilization for only a few hours, and the spermatozoon's capability lasts not much longer, conception must, theoretically, take place a few hours after ovulation. Practically, however, it seems that many women are capable of fertilization at any time in the menstrual period. Accurate data are necessary to determine this point which has hitherto been undecided, because the information obtained depended upon the memory and truthfulness of women. Perhaps Hartman will help us out on this point as on many others, when he obtains more data from his studies on monkeys.)

A. Hermstein⁴ found that the tubal corners of the uterus are regu-

larly closed even in the first month of pregnancy and this closure is chiefly the result of the growth of decidua. (If this is universally true, then those who maintain that superfetation is impossible have a strong argument in their favor.) Experimenting with guinea pigs, H. L. Dawson⁵ found that in pregnant females the number of hairs which regenerate reaches a minimum at the time of delivery; hence there seems to be a negative correlation between the regeneration of hair and pregnancy. (Not all experimenters agree with this conclusion.)

The rôle of vitamins in pregnancy is thoroughly discussed by H. Vignes⁶ who emphasizes that these substances are necessary not only for the growth of the uterus and other organs but also important because they are transmitted to the newborn child. Vignes points out the results of the absence of each of the vitamins in the diet of pregnant women. (Obstetricians should appreciate the value of some of the vitamins for pregnant women and their unborn babies.)

A new pelvimeter for the measurement of the bispinous diameter is described by S. Hanson.⁷ The value of the roentgen ray in obstetrics is discussed by H. B. Matthews⁸ and also by J. R. Reinberger and P. C. Schreier.⁹ G. W. Grier¹⁰ emphasizes the value of the lateral x-ray view in the diagnosis of pregnancy and H. Thoms¹¹ explains how to determine fetal maturity in utero by means of the roentgen ray. The latter author¹² also points out that the only means of accurately measuring the transverse diameter of the superior strait is by means of x-ray pelvimetry. T. O. Menees, J. D. Miller, and L. E. Holly¹³ recommend the injection of strontium iodid through the uterus into the amniotic cavity to give contrast to the fetus and placenta. By means of this procedure the authors can occasionally determine the sex of the child and also the location of the placenta. (The amount of information which can be obtained by this procedure does not justify the risk of damage which may result.) D. S. Hillis¹⁴ describes how to diagnose contracted pelvis by an impression method without the aid of an assistant. Contrary to the usual opinion, J. Andérodias and R. Mareille¹⁵ maintain that the fetal head in primiparas usually does not become engaged until late in pregnancy or until after labor has begun. Therefore, nonengagement of the head in the last month of pregnancy is not a certain indication of dystocia. (The reviewer's experience has been that in the majority of primiparas, the fetal head is engaged before the onset of labor.)

During the past year increased experience has been reported with various tests to detect early pregnancy. Z. Bercovitz¹⁶ reports his studies on the pupillary reactions of pregnant women after the instillation of their own serum into the conjunctival sac. This test was positive in 80 per cent of one group and in 62 per cent of another series. E. Monoiloff^{17, 18} reports two series of cases in which he employed his serum reaction for the determination of pregnancy. He reports positive results in 94 per cent of 2,238 cases, but M. Rodecort and C. Jernakoff¹⁹ say that this test is unreliable. H. Küstner²⁰ recommends the injection of hormone of the anterior lobe of the hypophysis to detect pregnancy. If the uterus contracts after the injection, the patient is pregnant. During the time the uterus contracts the patient loses consciousness and her face becomes pale. (This is a heroic test for information which is rarely urgent and which may be obtained either by a little patience or by the use of simpler and safer procedures.)

The test which has proved to be safe and reliable for the detection of early pregnancy is the Aschheim-Zondek test. Among the reports which have appeared this year may be mentioned those by B. Zondek,²¹ E. M. Robertson,²² B. Stone,²³ J. Kreis,²⁴ F. A. E. Crew,²⁵ B. Parvey,²⁶ H. Allan and F. Dickens,²⁷ H. M. Evans and M. E. Simpson,²⁸ F. A. Wahl,²⁹ H. C. Mack,³⁰ and G. Liese and E. S. Auer.³¹ The Aschheim-Zondek test was modified by L. Brouha, H. Hinglais and H. Simmonet³² who employed male infantile mice instead of females. These authors claim that their modification enables them to make 100 per cent correct biologic diagnoses. E. J. Kraus³³ independently put this modification into practice at the same time as the French authors, but he believes that whereas the new procedure can supplement the original Aschheim-Zondek test, it cannot replace it. S. Aschheim³⁴ condemns the new modification because first of all it requires ten days to know the result and second because Kraus found that urines which in female infantile mice yielded only reaction I (this is not characteristic of pregnancy) produced in male animals the customary enlargement of the male genitalia which is considered characteristic of pregnancy. Hence the test which employs male mice is not reliable. K. Ehrhardt³⁵ obtained the Aschheim-Zondek reaction from the urine of nonpregnant women by injecting large amounts of hypophyseal hormone into the blood of these women. As a protection against the misuse of the Aschheim-Zondek test, A. Stern³⁶ issues the following warnings: To be sure the urine is obtained from the proper person, it should be drawn off by catheter; the test should be performed only by a physician and only with the sanction of the patient. The results should be communicated to the patient herself not by telephone but by mouth or by letter.

E. Philipp³⁷ takes issue with Aschheim and Zondek on the source of the so-called hypophyseal hormone. The latter authors maintain that most of this hormone is produced by the anterior lobe of the pituitary gland but Philipp is of the firm belief that the products of pregnancy, especially the placenta is the source. Hence the Aschheim-Zondek reaction is not a hypophyseal but a placental reaction. E. Fels³⁸ agrees with Philipp.

A. R. Bacon³⁹ found that hypophyses from pregnant cattle were poorer in hormone than the hypophyses from nonpregnant animals, in spite of the fact that the hormone content of the blood in the former is vastly greater. Likewise K. Ehrhardt and B. T. Mayes⁴⁰ found no anterior lobe hormone in six hypophyses obtained from pregnant women but did find this hormone in 30 out of 32 hypophyses taken from nonpregnant individuals. (The important and highly practical investigations of Aschheim and Zondek have stimulated workers all over the world to follow up and utilize the results of these studies. Nearly all authors are agreed that the Aschheim-Zondek test is one of the most notable achievements in obstetrics in recent times. This test is of value not only in the detection of early pregnancy but also of hydatidiform mole and chorionepithelioma. Should a chorionepithelioma develop after the removal of a hydatidiform mole, its presence can be detected with a great degree of certainty by the Aschheim-Zondek test. Likewise recurrence of chorionepithelioma may be diagnosed early by this test.)

C. G. Hartman⁴¹ describes vividly the reproductive phenomena in the monkey. He has observed bleeding early in pregnancy in every one

of 18 pregnancies among these primates. C. U. Moore, H. G. Dennis, and B. I. Phillips⁴² recommend that pregnant women take 10 to 20 drops of activated ergosterol from the third to the beginning of the ninth month of gestation in order to prevent rickets in the newborn.

Abortion.—B. Beuthner⁴³ praises the intrauterine application of charcoal in the treatment of abortion and believes its good results are due to the fact that it has absorptive properties and therefore prevents the penetration of bacteria into the tissues. J. Olow⁴⁴ favors active treatment for febrile abortions as well as for afebrile ones. On the other hand, K. Sommer and H. Ziegeler⁴⁵ report that each year they become more and more conservative in the treatment of septic abortion. H. Reichelt⁴⁶ is of the opinion that the treatment of abortion should be neither active nor entirely expectant but individual. (The reviewer believes by far the best results in febrile abortion are to be obtained by conservative therapy. The only indication for interference is profuse or persistent bleeding. The uterus can usually be emptied of retained products of conception by the administration of quinine and pituitary preparations.)

Roentgen-ray abortion for therapeutic reasons is condemned by K. Bollag⁴⁷ because first of all, the abortion may not follow the roentgen-ray treatment for a long time, second, in many cases there is retention of the ovum, bleeding and infection, third, there is a bad effect on the patient especially if she must wait months for the abortion to take place, and fourth, not all roentgenologists know how to produce abortions by means of the x-ray, hence when failures occur, idiots or monsters may be born. (It is much more certain and almost as safe to perform a therapeutic abortion by an operative procedure, using local anesthesia in most of the cases.)

Complications.—The prognosis of heart disease in pregnancy is discussed in two papers by W. D. Reid,^{48, 49} who believes that probably 90 per cent or more of cardiac patients survive pregnancy and parturition. This author maintains that married women with heart disease die before their time because of the natural evolution of heart disease rather than because of childbearing. G. Herrmann and E. L. King⁵⁰ discuss cardiovascular disturbances in obstetric patients with special reference to electrocardiographic observations. In a study of 24 cases they found that ether predisposed to fatal pulmonary edema in patients with the pulmonary congestion of mitral stenosis. Of the general anesthetics, ethylene is the best, but the safest of all is local anesthesia. P. A. Daly⁵¹ outlines the management of cardiac patients during pregnancy. He maintains that if failure does not occur during the long months of gestation it seldom takes place because of labor. J. Meyer, J. E. Lackner and S. S. Schochet⁵² review the literature on paroxysmal tachycardia in pregnancy and report a case of their own. In the majority of cases the condition is well tolerated. (In the management of pregnant women who have cardiac complications the obstetrician should seek the advice and cooperation of a cardiologist. Most deliveries in women with heart disease may safely be accomplished from below but in a definite proportion of these women the safest and simplest form of delivery is cesarean section under local anesthesia aided by morphine or pantopon.)

A study made by J. L. Reycraft⁵³ a few years ago revealed that at least 30 per cent of the women of childbearing age in Ohio have hyperthyrophy or hyperplasia of the thyroid. This author recently examined

300 pregnant women and found that 52 per cent had an appreciable enlargement of the thyroid. He recommends that some form of iodine therapy be instituted almost systematically to prevent goiter. In the Lahey clinic, H. M. Clute and D. H. Daniels⁵⁴ found that the incidence of pregnancy in 3,678 cases of hyperthyroidism was 0.41 per cent. When properly treated hyperthyroidism does not cause an unnatural termination of gestation in most cases. Pregnancy, however, is an added burden in hyperthyroidism and should be avoided if possible. Thyroidectomy for primary hyperthyroidism may be undertaken during pregnancy with safety to both mother and child. It is the belief of J. W. Hinton⁵⁵ that 90 per cent of cases of hyperthyroidism associated with pregnancy can be carried to a normal delivery if properly managed. (Most pregnant women should be given iodine in one form or another, especially those who live in the so-called "goiter-belts." However, care must be exercised because in women who have adenomas without symptoms of hyperthyroidism, the latter may be precipitated by the liberal use of iodine.)

E. C. Hartly⁵⁶ describes a group of symptoms in pregnancy under the heading of tetanoid syndrome. Among these symptoms are cramp-like or aching pains in the legs and thighs, an unusual irritability of disposition, insomnia, often edema of the extremities not associated with cardiac or nephritic pathology and parasthesias of the extremities. The treatment of this syndrome includes the oral administration of calcium, the use of parathormone and irradiated ergosterol.

Two cases of diabetes in pregnancy are reported by H. Nevinny and G. Schretter.⁵⁷ In both cases the diabetic condition improved toward the end of gestation and became worse during the puerperium. These authors are opposed to Holzbach's belief that the fetal pancreas takes on some of the function of the mother's pancreas. They review the literature on the subject of diabetes in pregnancy and append an extensive bibliography. H. Bowcock and J. R. McCord⁵⁸ report the occurrence of diabetes during pregnancy in a woman who gave birth to large babies. (Thanks to insulin, diabetes in pregnancy is no longer as serious a complication as it formerly was. However, in an occasional case insulin will not prevent the progress of diabetes during gestation and the latter will have to be terminated.)

It has been the rare fortune of H. Vignes⁵⁹ to have observed ten patients who had asthma during gestation and these ten women had 26 pregnancies. Nine of these gestations ended as spontaneous abortions and in three instances therapeutic abortions were performed. No serious mishaps were seen in any of the cases. A. C. Williamson⁶⁰ also presents a study of cases of asthma and hay fever associated with pregnancy. This author found that the asthmatic group bore out the part played by heredity in transmitting the tendency to the disease because every child showed an eczema or a food idiosyncrasy. Williamson found that women with asthma seem to have less frequent attacks during pregnancy and the puerperium. The treatment during gestation is the same as in the nonpregnant state.

H. L. Barnes and L. R. P. Barnes⁶¹ analyzed questionnaires pertaining to 410 pregnant tuberculous women. They believe that a woman with active tuberculosis should avoid pregnancy in order to be spared the extra work and worry of a baby and that the baby may be spared the risk of infection. Pregnancy in itself has a harmful influence in only a small percentage of cases and abortion, being unnecessary in

the majority of the favorable and futile in most of the unfavorable cases, is rarely beneficial to tuberculous women. H. B. Matthews and L. S. Bryant⁶² studied the obstetric histories of 484 patients who graduated from the Trudeau Sanatorium. They found that pregnancy had a deleterious effect on tuberculous women. The women who took sufficient time before becoming pregnant after being "cured" (three years or more) and who obeyed all the rules, fared better than those who did not. Out of 579 children, 556 are alive and 501 are well. Only 9 have tuberculosis. (With increasing knowledge about the association of pregnancy and pulmonary tuberculosis we are becoming more and more conservative in treating pregnant tuberculous women. It is rarely necessary to interrupt gestation and if this is not done during the first three months it is far safer to permit the pregnancy to continue to term. In the delivery of tuberculous women, local anesthesia should be used in preference to any other.)

A number of papers have appeared on the subject of anemia in pregnancy. P. B. Bland, L. Goldstein and A. First^{63, 64, 65} in three papers report that 47.4 per cent of 1,000 pregnant women had a red cell count of 3,500,000 or less. The most interesting feature of this study was the remarkable recovery which the women made within two to six months after delivery. In a series of 300 pregnant women, J. H. Moore⁶⁶ found that fully 50 per cent showed a reduction in hemoglobin readings and red blood cell counts, sufficient to place them in need of therapeutic measures to combat the anemia. B. C. Nalle⁶⁷ and Y. Suwa⁶⁸ likewise discuss the question of secondary anemia in pregnancy whereas K. Heim⁶⁹ and R. Peterson, H. Field and H. S. Morgan⁷⁰ report cases of pernicious anemia during gestation. Heim believes that these cases of pernicious anemia belong in the category of the toxemias of pregnancy. The latter authors report three cases successfully treated by means of liver and blood transfusions. (It is gratifying to see the increasing attention paid to a study of the blood in pregnancy. Since at least 50 per cent of all pregnant women have anemia, it is imperative that obstetricians include blood counts in their routine prenatal care. When a red count of 3,500,000 or less, or a hemoglobin of 70 per cent or less is found, the patient should be treated intensively by means of diet, arsenic, iron, ultraviolet light and occasionally by the intramuscular injections of whole blood.)

An excellent paper on syphilis and pregnancy is presented by J. R. McCord⁷¹ who proves indisputably the horrible results of the positive blood Wassermann reaction in pregnant negroes and the value of antiluetic treatment during gestation. Pregnancy ended disastrously in 80 per cent of women who received no treatment, whereas with good prenatal antisyphilitic treatment, 93 per cent of the babies were born alive. Another interesting article on this subject is that by U. J. Wile and J. W. Shaw⁷² who likewise show that prenatal treatment of syphilis results in a great decrease of fetal deaths. These authors emphasize that regardless of clinical or serologic observations it is best to treat babies born of mothers in whom the syphilis is early, to supplement the prenatal treatment of the mother. (These two papers are worth rereading.)

As previously mentioned the Aschheim-Zondek test has proved to be valuable not only for the diagnosis of early pregnancy but also for the detection of hydatidiform mole and chorionepithelioma. S. Aschheim⁷³ himself describes the technic and results and mentions its use-

fulness in hydatidiform mole and chorionepithelioma. H. E. Mack and A. E. Catherwood,⁷⁴ F. Schultze-Rhonhof,⁷⁵ W. Haupt,⁷⁶ K. Ehrhardt⁷⁷ and O. Fahlbusch⁷⁸ report cases showing the value of the Aschheim-Zondek test in the diagnosis and treatment of these neoplasms. Nearly all are agreed that the presence of a hydatidiform mole or a chorionepithelioma produces a marked increase in the amount of hormone of the anterior lobe of the hypophysis in the urine and hence a strong Aschheim-Zondek test. If after removal of the newgrowths, the test becomes negative, the prognosis is good. If, however, the test remains positive for a long time it is an indication that all the disease has not been removed or that a hydatidiform mole has become converted into a chorionepithelioma or that a recurrence has taken place. B. Zondek⁷⁹ recommends a new test for the diagnosis of chorionepithelioma, namely, the determination of the content of the pituitary hormone in a piece of tissue excised or removed by means of a curette. To determine the presence of hormone the tissue is implanted into animals after detoxication.

E. Novak and A. K. Koff^{80, 81} discuss the question of chorionepithelioma and emphasize certain facts. While ordinarily this condition is extremely malignant it runs a favorable course in about 10 per cent of the cases with either spontaneous cure or cure after an incomplete operation. Further, in a considerable number of cases in which extensive metastases have occurred, no trace of the original tumor can be found. A third fact is that both chorionepithelioma and hydatidiform mole are often associated with characteristic changes in the ovaries. In one paper Novak and Koff deal with the disappearance of the primary uterine tumor in cases of chorionepithelioma, whereas in another article they discuss the ovarian and pituitary changes associated with both hydatidiform mole and chorionepithelioma and report four cases of their own. H. Schmitz and W. Hueper⁸² emphasize that all tissue expelled during an abortion, full-term labor or as a hydatidiform mole should be examined for a newgrowth of the chorion. They believe that hysterectomy is the operation of choice for chorionepithelioma even if metastases are present and radiation combined with surgery may improve the results of surgery. Z. v. Szathmary⁸³ cites the reports of four cases of chorionepithelioma cured by roentgen-ray treatment alone and seven additional cases where radium was used. He suggests that elderly women who have hydatidiform mole should be treated with small doses of radium prophylactically.

G. W. Gustafson⁸⁴ discusses *Trichomonas vaginalis* vaginitis complicating pregnancy. (Increasing attention is being paid to the leucorrheal discharge which is associated with the *Trichomonas vaginalis*. Most authors have found that when this condition exists during pregnancy, there is a greater tendency to puerperal morbidity. Women may safely be treated during pregnancy and they can assist the treatment by taking 0.5 per cent lactic acid douches.)

L. A. Wilson⁸⁵ takes up the subject of pregnancy and labor associated with granuloma inguinale, P. B. Bland and L. Goldstein⁸⁶ review the subject of pregnancy and Parkinsonism, and J. P. Greenhill⁸⁷ writes on necessary pelvic and abdominal operations during pregnancy.

The Toxemias.—The studies of H. Frey and E. Herrmann⁸⁸ lead them to conclude that in pregnant women there exists a more pronounced vestibular reaction than in nonpregnant women. This is particularly

noticeable in the early months of gestation and especially among those who complain of vomiting. P. A. Cabanes⁸⁹ claims he cured eleven cases of hyperemesis by the production of fixation abscesses or the injection of aseptic pus but he adds that the diet was also important. P. Caffier⁹⁰ advocates the glucose and insulin treatment of hyperemesis but warns that this therapy may be dangerous. He observed two cases of hypoglycemia shock and three cases of beginning hypoglycemia among 20 patients so treated. J. Hofbauer⁹¹ takes issue with Caffier and points out that in cases of excessive vomiting, abortion occurs just as frequently among women who do not receive the glucose-insulin therapy as among those who do. Hofbauer showed that insulin protects the liver and kidneys against damage. H. Saenger⁹² was able to find in the entire literature only 34 reports of autopsies on patients who died of hyperemesis. In most of these cases too long a time had been permitted to elapse before therapeutic abortion was performed. None of the deaths occurred before the tenth week of pregnancy. (The reviewer's treatment of hyperemesis has not changed during the last few years. He still relies upon isolation, rest in bed, forced fluids, glucose administered subcutaneously and intravenously, sedatives including sodium luminal, duodenal feeding and a liberal amount of psychotherapy. Thus far he has been fortunate but there will most likely be an occasional patient who will not improve and who will have to have her pregnancy interrupted. The important thing is not to let the condition progress so far that a therapeutic abortion is too late to be of any avail.)

G. W. Theobald⁹³ points out the rarity of the toxemias of pregnancy in Siam and other countries in the far East. He also⁹⁴ expresses the belief that eclampsia is caused by toxins which are absorbed from the intestinal canal and which owing to a breakdown in the defenses of the body are not detoxicated. D. I. Macht and J. R. Losee⁹⁵ made a phytopharmacologic study of the bloods from eclamptic patients and failed to find any poisonous substance which is toxic for certain living seedlings.

Liver function tests in the toxemias of pregnancy are discussed by E. L. King⁹⁶ who feels that these tests do not furnish any evidence regarding prognosis which cannot be elicited by a careful clinical study. H. J. Stander, N. J. Eastman and E. P. H. Harrison⁹⁷ studied the acid-base equilibrium of the blood in the late toxemias of pregnancy. N. J. Eastman⁹⁸ investigated the serum proteins and H. J. Stander and N. J. Eastman⁹⁹ the H-ion concentration in these toxemias.

Seven additional serial blood-sugar curves are reported by P. Titus, E. W. Willetts, and H. D. Lightbody¹⁰⁰ to confirm their contention that there is a wide fluctuation in blood sugar in exceedingly short intervals of time during an eclamptic seizure. These curves as well as the preceding twelve show that it is characteristic for convulsions to be preceded by sharp falls in blood sugar; periods which have been called "relative hypoglycemia." Titus considers dextrose to be specific treatment for eclampsia and preeclampsia.

L. Dorsett¹⁰¹ in one article as well as in another written with O. H. Schwartz¹⁰² advocates conservatism with chief reliance upon magnesium sulphate and glucose for the treatment of the late toxemias of pregnancy. W. T. McConnel¹⁰³ recommends the continuous drip method of administering glucose intravenously for these toxemias. J. L. Reyecraft¹⁰⁴ believes that hepatic extract is of considerable value

in these cases but "should not be used to the exclusion of other types of treatment, including the use of sedatives, elimination, etc., and it is most beneficial in the more severe types of cases when combined with the liberal administration of glucose." J. H. Moore¹⁰⁵ reports good results in four toxemic patients treated with sodium amytal.

V. J. Harding and H. B. Van Wyk¹⁰⁶ found that the administration of hypertonic saline solutions in the toxemias is harmful. These authors have no fear of giving high protein diets not only to pre-eclamptic but also to eclamptic patients but they advocate a salt-free diet as the essential thing in the treatment of the toxemias of pregnancy. Other papers on the prevention and treatment of the late toxemias of pregnancy have appeared by L. Seitz,¹⁰⁷ M. E. Davis,¹⁰⁸ W. O. Klein,¹⁰⁹ C. B. Upshaw,¹¹⁰ J. R. Reinberger and P. C. Schreier,¹¹¹ E. Thulin,¹¹² N. Gyllewsvard,¹¹³ P. Rissman,¹¹⁴ B. Stroganoff¹¹⁵ and many others. Stroganoff now treats most of the eclamptic patients in Leningrad by giving advice over the telephone.

J. C. Llamas-Massini¹¹⁶ performed 16 cesarean sections for eclampsia without a maternal or fetal death, and H. W. Johnson and R. A. Johnston¹¹⁷ report 25 cases of late toxemia of pregnancy delivered by cesarean section under spinal anesthesia. All the mothers recovered and only one baby died. (The best treatment for the large majority of eclamptic patients is ultra-conservatism, i.e., the administration of narcotics and sedatives including magnesium sulphate, glucose, and perhaps purgatives, but nothing else. Gastric lavage, colonic irrigation and hot packs frequently do harm. The pregnancy should be left alone. In the hands of trained obstetricians, however, the best results will be obtained by emptying the uterus in the safest possible manner. This usually means delivery from below but not by accouchement forcé. In a certain number of eclamptic women cesarean section is indicated. Regardless of how an eclamptic patient is delivered, *only local anesthesia* should be used if an anesthetic is necessary.)

R. Kobes¹¹⁸ reexamined 51 patients of whom 32 had previously had eclampsia and 19 had had preeclampsia. Not one of the eclamptic patients developed chronic nephritis but at least two of the 19 women with preeclampsia showed this condition. However, many women complained of severe headaches following eclampsia and this indicates injury to the central nervous system. Since the best test of kidney function in women who have had toxemia is another pregnancy, S. Berman¹¹⁹ studied 225 women who had more than one pregnancy following a toxemia at the Boston Lying-in Hospital. He concludes that the incidence of cardiovascular-renal disease increases with each succeeding pregnancy. Once a patient has had toxemia she should be studied most carefully between pregnancies and in future gestations receive exceptional prenatal care. F. J. Browne and G. H. Dodds¹²⁰ has shown in rabbits that chronic renal damage may exist during the intervals between pregnancies and yet give no clinical indication of its presence. These observations suggest that in the so-called "recurrent toxemias of pregnancy" there is all the while a mild degree of chronic renal damage which undergoes exacerbations under the strain of pregnancy. (The reviewer¹²¹ has likewise found that many women who recover from having had toxemia of pregnancy show signs of toxemia in subsequent pregnancies in spite of the fact that they are apparently normal between pregnancies.)

LABOR

General.—M. Luis Perez¹²² withdrew between 50 and 300 c.c. of blood from women in active labor and injected the blood intravenously into 50 pregnant women who were past term. In 50 to 60 per cent of these cases labor was successfully induced. In an elaborate experimental study of the dog and rabbit, L. Rudolph and A. C. Ivy¹²³ report on the mechanism of labor studied under direct observation, the effect of stimulation and section of the extrinsic nerves of the uterus, the effect of certain drugs on the uterus in situ by the use of a method which graphically records uterine motility and also experimental rupture of the uterus.

A comparative study of H. W. Mayes and S. Ullian¹²⁴ of the bacterial flora of the birth canal with and without the use of mercurochrome as a vaginal antiseptic showed that following the use of mercurochrome the number of positive vaginal cultures was reduced from 44 to 6 per cent, positive cervical cultures from 16 to 4 per cent, and positive membrane cultures from 32 to 6.4 per cent. (For the last few years I have been using mercurochrome routinely before and after labor in every patient delivered vaginally but I am still not certain that it has made much difference in morbidity. I shall, however, continue to use it.)

J. M. Laferty¹²⁵ has found Tweedy's rules for conducting a test of labor to be most useful. These rules are as follows: When the mother's pulse rate increases and the temperature rises above 100 degrees F. interference is indicated on behalf of the mother. When the fetal heart sounds rise above 160 or fall below 120 on three successive counts of one minute intervals, interference is indicated on behalf of the baby. (It is not advisable to follow such fixed rules in every case for there are many exceptions. Furthermore fever during labor is *not* an indication to perform an operative delivery. It is far safer to wait for spontaneous delivery.) C. C. Norris¹²⁶ considers a dry labor as a complicated labor and one which can most advantageously be treated in a well-equipped maternity hospital. If labor does not begin within twenty-four hours after the membranes rupture, a therapeutic induction is usually indicated, preferably by the Watson method. If this fails a rectal tube or a colpeurynter should be used. D. A. Mitchell¹²⁷ recommends the suggestion of Philip Jones, namely, the routine administration of small doses of quinine for three weeks before labor is expected. No harm was observed in over 400 cases where quinine was given in this way. (Quinine occasionally does do harm. There is absolutely no necessity for interfering with normal pregnancy in this manner.)

In a discussion on the mechanism of labor, A. J. Rongy¹²⁸ maintains that when the fetal head enters the pelvis with its neck near the sacral promontory, as in occipitoposterior and mentoposterior positions, spontaneous delivery of the child is either difficult or impossible. When, however, the fetal neck is close to the pubic arch as in occipitoanterior and mentoanterior positions, spontaneous delivery is the rule.

A statistical study made by L. A. Calkins, J. H. Irvine and G. W. Horsley¹²⁹ led them to controvert the beliefs in the long labor of the stout woman, of the elderly primipara, and of the woman with a small pelvis or a large baby. (These statements should be corroborated on a much larger series of cases.)

During the last two years a number of papers have appeared on the use of thymophysin. N. Temesvary,¹³⁰ its originator, read a paper in this country in which he advocated this drug to shorten labor. In an experience of many thousand cases, he never observed any harmful results. M. Davis¹³¹ reports a series of 50 cases in which he found the drug to be very helpful. J. Jarcho¹³² also claims his results were very encouraging. Other authors who report good results are F. Holtz,¹³³ J. S. Diasio,¹³⁴ and L. W. Haynes,¹³⁵ who analyzed a series of 500 cases. On the other hand, F. Pachner¹³⁶ reports a case of spontaneous rupture of the uterus after the use of thymophysin. K. Kaiser¹³⁷ takes issue with Pachner and believes the latter should have reported his case as "Another Uterine Rupture Following the Injudicious Injection of an Oxytocic." E. Puppel¹³⁸ has given up the use of thymophysin because it frequently altered the fetal heart tones to such an extent that he had to hurry and deliver the babies. E. Graff¹³⁹ criticizes Puppel's paper and also Pachner's report of uterine rupture. He speaks very highly of thymophysin and says that the slowing of the fetal heart tones after the use of thymophysin does not frighten him because they quickly become normal again. H. W. Schoeneck and F. J. Schoeneck¹⁴⁰ used thymophysin in 35 cases and found it to be a powerful uterine stimulant, its action occasionally simulating pituitrin. They advocate small doses. M. P. Rucker¹⁴¹ studied the behavior of the uterus after the use of thymophysin by means of the kymograph in four cases and found that the character of the contractions were dangerous to mother and child. The response when positive was incomplete tetanus lasting from sixteen to twenty-four minutes. (I am responsible for having secured the opportunity for Dr. Temesvary to read his paper on thymophysin in this country last year. After Dr. Temesvary left I began using thymophysin and found that the drug shortened labor considerably without apparently doing harm. However, in writing and speaking of this drug I emphasized that it should be used *only* for cases where the pains have slowed down in frequency and strength, *only* in 3 minim doses and *only* in the first stage of labor. Recently adverse criticism began to appear against thymophysin. I therefore arranged with the president and chief chemist of the Wilson Laboratories to supply me with ampules which contain only one-fourth the strength of pituitary substance sold on the market. I have thus far used this 25 per cent pituitary substance in three minim doses in 30 cases where there were weak and infrequent pains during the first stage of labor and I found that the action of this weak pituitary was almost identical with that of thymophysin. I shall, however, withhold a definite opinion as to whether or not thymophysin is only the equivalent of weak pituitary until I shall have had a larger series of cases. The 25 per cent pituitary, like thymophysin, quickly reestablishes regular uterine contractions in the first stage when pains are infrequent and weak. If the patient is having false labor pains, these cease entirely shortly after the administration of pituitary. Neither thymophysin nor pituitary preparations should be given routinely to shorten labor.)

R. Mahon¹⁴² studied the effects of pituitary preparations and ergot by means of hysterography and maintains he never observed any increase in toniccy produced by pituitary substance. He believes that pituitary and ergot preparations have exactly the same effect on the uterus. However, he unqualifiedly condemns ergot and says it should

be replaced by pituitary substance in every obstetric case. (These findings are in disagreement with the results of Rucker and Haskell who found that pituitrin even in two minim doses can produce a marked tetanus of the uterus. Rucker and Haskell's results are much more reliable because they employed intrauterine hystero-graphy whereas Mahon employed external hystero-graphy. There have been enough reports during the last few years to indicate that pituitary substance at least in the strengths now sold on the market is dangerous in the first and especially in the second stages of labor.)

Analgesia and Anesthesia.—J. T. Gwathmey¹⁴³ reports a further study of his obstetric analgesia based on more than 20,000 cases. The results were excellent for both mother and child. P. T. Harper¹⁴⁴ makes a plea for the more general use of the Gwathmey method especially in the troublesome cases where the membranes rupture before the cervix is dilated. C. O. McCormick¹⁴⁵ devised a new apparatus for the instillation of the rectal-ether analgesia. H. S. Fist¹⁴⁶ claims to have produced very satisfactory analgesia by means of a combination of magnesium sulphate and scopolamine because these drugs are synergistic. C. B. Reed¹⁴⁷ is of the opinion that avertin definitely mitigates the pains of labor in most instances, it interferes but very slightly with uterine contractions, and does not appear to pass over to the baby. Likewise H. Naujoks¹⁴⁸ believes that avertin produces a painless labor and he advocates it as the best narcotic for patients with eclampsia. However, J. S. M. Connell¹⁴⁹ has not observed painless labors after avertin. He has nevertheless found the drug to be very helpful and recommends it. (The Council of Pharmacy and Chemistry of the American Medical Association¹⁵⁰ says the following: "Though the present evidence indicates that avertin may prove valuable as a means of initiating narcosis [so-called basis narcosis but not for complete narcosis] the Council decided not to admit the drug to New and Non-official Remedies.")

J. Putz¹⁵¹ and H. Goldschmidt¹⁵² both feel that pernocton is a useful twilight-sleep producing drug which has no harmful effects if properly used. J. J. Swendon¹⁵³ believes that the intravenous administration of sodium amytal induces satisfactory amnesia during labor. However, one-third of the babies are born apneic and require stimulation. (Our results with sodium amytal were not satisfactory.)

Records of intrauterine pressure have been obtained by A. W. Bourne and J. H. Burn¹⁵⁴ showing the effect of anesthetics on uterine contractions during labor. They found that chloroform and ether at once arrest the contractions in the first stage and diminish their force and frequency in the second stage. Gas and oxygen have no effect on the contractions during labor. Intraspinal injection of stovain does not inhibit the contractions but interferes with full relaxation between the pains. Morphine lessens the frequency of the contractions but the work done by the uterus is probably as great or greater than before. Atropine appears to stimulate the contractions but quinine has very little effect. A. Gremme¹⁵⁵ recommends the use of local anesthesia with perkain injected paracervically for the diminution of labor pains. T. Torland¹⁵⁶ favors novocain for the purpose of perineal block and K. Heim¹⁵⁷ recommends either direct infiltration or parasaeral anesthesia. W. M. Bailey¹⁵⁸ believes that controllable spinal anesthesia is a safer, simpler and more efficient anesthetic procedure than inhalation anesthesia. H. W. Featherstone¹⁵⁹ recommends gas-oxygen for

most difficult vaginal operations but believes that spinal anesthesia is useful for cesarean sections. J. W. Burns¹⁶⁰ maintains that spinal anesthesia is the ideal method of dealing with pregnancy complicated by serious cardiac lesions and K. Wislanski¹⁶¹ reports 60 cesarean sections successfully performed under lumbar anesthesia. (The increased use of local anesthesia in obstetrics is to be commended. Direct infiltration is far safer than spinal anesthesia especially for pregnant women and hence should be used whenever possible. Episiotomy, low forceps operations and cesarean sections can readily be done under infiltration anesthesia.)

Complications.—For a long time E. D. Plass¹⁶² has been skeptical of the necessity for correcting retroversion of the uterus when it is detected after delivery. He has therefore treated a large group of patients in complete disregard for the position of the uterus and has seen no harm. He maintains that retrodisplacement is not a common cause of sterility and also that retrodisplaced pregnant uteri almost invariably are replaced spontaneously during the first four months of gestation. (The reviewer agrees with the statements made in this interesting paper. He seldom uses a pessary for postpartum retroversion of the uterus except for the rare, large, subinvolted, soft uterus.)

In a series of 1,750 abdominal and vaginal cesarean sections performed by I. W. Potter,¹⁶³ 16 subsequent ruptures are known to have occurred. Potter saw an additional case, and in the entire series of 17 cases, there were 3 maternal and 9 fetal deaths. H. Sachs¹⁶⁴ reports that among 20,800 labor cases there were 36 uterine ruptures (0.2 per cent). He found that two-thirds of the spontaneous ruptures occurred among multiparas which speaks for a deterioration of the uterine musculature after repeated pregnancies. The total maternal death rate was 53 per cent of which 33 per cent were due to infection. There was not a single instance of rupture in a previous cesarean section scar. A. von Probstner¹⁶⁵ reports five cases of rupture of the uterus caused by the injudicious administration of pituitary substance. Only one patient recovered. (The incidence of uterine rupture in Potter's series is unusually high. In more than 1,000 cervical cesarean sections performed at the Chicago Lying-In Hospital there has not been a single later rupture of the uterus as far as we know.)

Operative Obstetrics.—E. Waren¹⁶⁶ reports 31 cases in which on account of primary insufficiency of labor pains he prophylactically used a metal dilator to shorten the period of dilatation. This procedure required from two to ten hours. (There is no harmless way of instrumentally dilating the cervix of a full-term uterus.)

J. P. Greenhill¹⁶⁷ outlines the indications and conditions for the use of forceps and describes the technic of forceps deliveries and episiotomy. D. Miller¹⁶⁸ takes up the diagnosis and management of occiput posterior while R. J. Pieri¹⁶⁹ emphasizes the use of the modified Scanzoni maneuver for the delivery of a head in this position. N. W. Vaux¹⁷⁰ reviews his results in 212 cases of occiput posterior presentation among which the total fetal mortality was 6 per cent. He favors "a timely internal version in occiput posterior positions, elective in type, when the cervix is fully dilated and the membranes unruptured in preference to watchful waiting and forceps delivery by Scanzoni maneuver under like conditions." He performed version and extraction in 14.1 per cent of the 212 cases. (I agree with the quotation from

Vaux but I should like to emphasize that version and extraction are operations for skilled obstetricians only and not for general practitioners. It is true that the latter do a great deal of harm delivering patients with forceps but they will lose fewer mothers if they refrain from the frequent use of internal version.)

K. M. Wilson¹⁷¹ takes up the management of breech presentations and points out certain difficulties found in breech deliveries. (An attempt should be made in the last weeks of pregnancy to perform an external cephalic version. The latter should be performed with gentleness and the fetal heart tones should be controlled. The Trendelenburg position frequently simplifies this maneuver.)

S. Meeker¹⁷² reviews 193 versions and extractions which he performed. In this series he used a bag 114 times. The total fetal mortality was 9 per cent which the author corrects down to 3.1 per cent. Three mothers were lost (1.55 per cent). Meeker grants that delivery by version is not a popular method but he feels it is his "duty to relieve the mother of as much of the suffering of childbirth as possible when it can be done with safety." (Version is "safe" only in the hands of well trained obstetricians and they constitute only a small number of the physicians who deliver babies in this country.)

P. Henriot¹⁷³ reviews 24 cases of extemporaneous evacuation of the uterus under spinal anesthesia at the end of pregnancy performed by Delmas and his associates. There was one maternal death and four fetal fatalities. Gonnet¹⁷⁴ reports four additional cases. This author believes the results of the Delmas procedure are very inconstant and it should be employed for strict indications only. (This procedure is nothing but an accouchement forcé and, therefore, should be condemned.)

As in previous years a large part of the obstetric literature deals with cesarean section. By far the most extensive analysis is that of E. v. Ammon¹⁷⁵ who found that the incidence of cesarean section in German and American clinics varied from 0.04 per cent to 17.3 per cent. Among 2,685 classic operations, the maternal mortality was 5.9 per cent, for 1,415 extraperitoneal operations 5.4 per cent, for 5,365 laparotrachelotomies 4.1 per cent, and for 7,606 cases where different types of operations were used the death rate was 6.9 per cent. In the entire series of 17,071 cesarean sections there were 983 deaths (5.76 per cent) and infection was responsible for 67.2 per cent of them, embolus for 10.1 per cent, ileus for 5.2 per cent, pneumonia for 3.6 per cent, anesthesia for 2.3 per cent, etc. The mortality for clean cases was 2.8 per cent, for suspicious cases 6.2 per cent and for unclean cases 9 per cent.

The next largest analysis is that by W. B. Thompson¹⁷⁶ who surveyed 1,322 abdominal deliveries performed in Los Angeles with a mortality of 4.2 per cent. In the list of 209 operators, 75 performed only one operation and 59 from two to five, whereas two physicians each performed 75 or more operations. Of 197 women who had previously had a cesarean section, four experienced a rupture of the uterus. W. Ilkewitz, M. Lewi, and S. Selitzky¹⁷⁷ studied 743 cesarean sections performed in Moskow during 1921-7. Practically all the operations were of the classic type and the mortality was 7.8 per cent. There were five ruptures of the uterus after the operation in this series.

The largest series of cesarean sections from one institution was reported by J. P. Greenhill¹⁷⁸ who analyzed 1,059 cesarean sections per-

formed at the Chicago Lying-In Hospital. The maternal mortality for 147 classic operations was 4.76 per cent whereas it was only 1.26 per cent for 874 cervical operations. There were no deaths after the 38 Porro operations. Local anesthesia alone by the infiltration of novocain was used in 55.1 per cent of all the laparotrachelotomy cases. There were five deaths among 495 cases of cephalopelvic disproportion (2.4 per cent), one death among 85 preeclamptic patients (1.2 per cent), one death among 16 patients with eclampsia (6.3 per cent), no deaths among 42 cases of placenta previa and two fatalities among 28 cases of abruptio placentae. As far as is known there has not been a single rupture of the uterus in this series.

W. C. Danforth and R. M. Grier¹⁷⁹ performed 124 laparotrachelotomies with only one death (0.8 per cent) whereas among 57 classic operations they experienced 3 deaths (5.2 per cent). They regard the cervical operation as definitely preferable to the older operation. R. Hasselblatt¹⁸⁰ observed a mortality of 2.9 per cent among 275 cesarean operations most of which were laparotrachelotomies. K. B. Steele¹⁸¹ reports a series of 59 extraperitoneal cesarean sections with a mortality of 8.5 per cent, L. Nürnberger¹⁸² observed three fatalities in a series of 60 such operations and emphasizes that drainage is essential and H. T. Burns¹⁸³ devotes a paper to the advantages, disadvantages and technic of this operation.

T. Kumamoto and S. Nakayama¹⁸⁴ performed cesarean sections on 24 rabbits. These animals were then mated and four conceived and had normal labors. The tissue around the cesarean scars was found to be much thinner than the rest of the uterus. W. Pokrowsky and J. Rabinowitsch¹⁸⁵ studied the scars after classic cesarean section and found that in about 50 per cent of the cases the uterine wall was completely healed in the region of the incision. However, the wall in the area of the incision was thin in more cases than was suspected and the authors feel that on the whole the classic operation does not give a satisfactory late result. (In 1929, J. P. Greenhill and B. Bloom¹⁸⁶ reported a histologic study of 37 scars removed at the time of repeated cervical cesarean sections. In some cases the wound had healed so perfectly that no scar tissue could be found whereas in others the scars were extremely thin. Most of the scars, however, were well healed. The above analyses indicate most definitely that the cervical operation is superior to the classic cesarean section. In spite of this, the average mortality for all cesarean sections is still unduly high. Because of this the indications for the operation should be limited and not extended as some suggest.)

L. Kropp¹⁸⁷ examined 150 women who had had cesarean sections and were capable of having more children and found that all except 66 became pregnant. Of these 66 women, 56 used contraceptives, hence secondary sterility after cesarean section occurred in only 7.5 per cent. B. J. Kouwer¹⁸⁸ likewise concludes that there is no relative sterility after cesarean section. In a series of 105 women who had had a cesarean section, C. M. McLane¹⁸⁹ observed that 62 had another cesarean operation, 26 delivered spontaneously and 17 had forceps deliveries or breech extractions.

Changes in the bladder were found by E. Scheyer¹⁹⁰ in a certain proportion of all women after all types of cesarean section especially the extraperitoneal type. The bladder was usually drawn over to one side. The ureteral orifices were distorted and edematous, and cystitis

was present in many cases. However, these changes have no clinical significance. E. Martin¹⁹¹ performed 462 vaginal cesarean sections for the following indications: placenta previa 225, premature rupture of the membranes 81, eclampsia 61, renal disease 28, etc. Three mothers died in the placenta previa series (1.3 per cent).

Uterine Hemorrhage.—K. Meyer¹⁹² found that in the last ninety years among 134,770 labor cases there were 770 cases of postpartum hemorrhage. Of this number 19 patients died (2.4 per cent) and of the latter 8 died of hemorrhage and 11 of sepsis. In 13,000 confinements, K. Skajaa¹⁹³ found 11 cases of postpartum hemorrhage in which the uterine blood coagulated normally during labor. However, 15-20 minutes or longer after the bleeding ceased, it began again and at this time the blood did not coagulate. Blood taken from a vein coagulated normally, hence the uterus was the seat of a local hemophilia. Shock is the basis for this type of hemorrhage and the only successful treatment is vaginal hysterectomy. Seven of the eleven patients died. P. Balard¹⁹⁴ reviews 50 cases of late puerperal hemorrhage in which the mortality was 20 to 25 per cent. In 26 cases there was retention of placental tissue, whereas in 24 cases there was none. In the latter cases severe puerperal infection was present.

J. P. Greenhill¹⁹⁵ outlines the present-day treatment of placenta previa and emphasizes the value of abdominal cesarean section under local anesthesia for cases of central or partial placenta previa. In infected cases, a Porro operation should be performed. Blood transfusion should be thought of and used more frequently than is the habit today. For marginal placenta previa and for some cases of partial placenta previa, Greenhill recommends the older methods such as rupture of the membranes with or without vaginal tamponade, Braxton Hicks version and metreurysis. In a series of 118 cases of placenta previa the maternal death rate was 2.6 per cent. Of the 3 deaths one followed spontaneous delivery and the other two occurred after version and extraction. In the series of 42 cesarean sections and two Porro operations performed for placenta previa there were no maternal deaths. R. Kessler¹⁹⁶ reported a series of 107 cases of placenta previa with a death rate of 4.7 per cent. Among the 35 cesarean sections the only death was due to eclampsia. P. Balard¹⁹⁷ reports 36 cases of placenta previa treated conservatively with a mortality of 16.7 per cent and 12 cervical cesarean sections with no deaths. E. Puppel¹⁹⁸ observed 73 patients with this complication and 7 per cent died. However, among the 26 who were delivered by cesarean section all recovered. F. S. Kellogg,¹⁹⁹ on the basis of 22 cases of placenta previa treated by abdominal delivery, believes this operation should be employed for cases of partial or complete placenta previa. E. v. Ammon²⁰⁰ reviewed the literature on this type of hemorrhage and found that among 330 spontaneous deliveries 3 per cent of the mothers died, among 3,280 Braxton Hicks versions 7.5 per cent died, among 705 cases where a bag was used 5.2 per cent succumbed, among 414 versions and extractions 10 per cent died, among 637 vaginal hysterotomies 6.6 per cent perished, and in a series of 2,320 cesarean sections 7.3 per cent were lost.

PUERPERIUM

General.—It is the opinion of E. Vogt²⁰¹ that mother's milk is one of the most important carriers of vitamins because it contains a large amount of vitamins A, B, and C. This is another argument in favor of

breast-feeding. A. E. Kanter and A. H. Klawans²⁰² discuss in detail the management of the puerperal period. Recently Stolte praised the value of sunlamp irradiation of lactating breasts for stimulating the milk supply. H. Küstner and R. Börner²⁰³ used this therapy in 21 cases, but failed to observe any increase in the flow of milk.

Improved breast and abdominal binders for maternity patients are described by I. Wilens.²⁰⁴ A series of 196 postpuerperal blood sera obtained six weeks after delivery by D. I. Macht and H. Leach²⁰⁵ were examined by phytopharmacologic methods. It was found that the phytotoxic index of these sera was higher than that of normal human female blood serum. In 536 out of 540 gravid women, P. B. Bland, L. Goldstein, and A. First²⁰⁶ found that sedimentation occurred more rapidly than in normal nonpregnant patients. The same sedimentation rates as occurred during pregnancy were maintained during the first ten days after delivery. However, the rates returned to normal within six months after delivery in practically all the cases. The same authors²⁰⁷ observed that in 77 per cent of 230 gravid women the blood platelets varied from 200,000 to 350,000 per c.mm. of blood whereas 18.2 per cent had more than 350,000. Hence these blood elements are not appreciably increased in pregnancy. However, 27 per cent of 100 women examined after childbirth gained over 50,000 platelets per c.mm. within twenty-four hours following labor.

Sepsis.—L. G. Baldwin²⁰⁸ reviewed the morbidity in a series of 300 cases and concludes that mercurochrome did not reduce the maternal morbidity to any marked degree, and that operative procedures other than cesarean sections and forceps deliveries did not increase the morbidity. H. A. Miller, D. B. Martinez, and M. E. Hodgson²⁰⁹ recommend cauterization of the cervix during pregnancy by means of an electric cautery in cases where there are erosions. They have seen no harm in 2,000 cases and believe this procedure is a prophylactic measure against puerperal sepsis. (The reviewer has cauterized the cervix during pregnancy many times but chiefly for erosions which had a tendency to bleed slightly. No bad results were found.)

True hemolytic streptococci were isolated by J. Taylor and H. D. Wright²¹⁰ from the vaginas of 32 out of 1,123 women immediately after delivery (2.7 per cent). However, none of these organisms gave rise to infections in the puerperium. L. Colebrook and R. Hare²¹¹ conclude from their study that infection with *Streptococcus pyogenes* is a comparatively infrequent cause of the minor febrile disturbances of the puerperium. A. L. K. Rankin²¹² also reports a bacteriologic study of puerperal infection.

T. K. Brown²¹³ points out that whereas puerperal infections due to ordinary pathogenic organisms in most cases are introduced from the outside, infections due to anaerobic streptococci are usually endogenous. L. Colebrook²¹⁴ isolated anaerobic streptococci from the blood of 17 patients who had puerperal fever and seven of these women died (39 per cent). In a series of 98 normal pregnant women spirochetes were observed by A. F. Lash²¹⁵ in vaginal smears in three instances (3 per cent) and among 118 patients with puerperal infection, spirochetes were found in the cervical secretion of 8 women (6.8 per cent). M. Gundel and K. v. Oettingen²¹⁶ found bacteria in the uterus of half of their pregnant women. The most common bacteria were Doederlein's bacilli and these came from the vagina. In a series of 374 fetal blood cultures examined by A. J. Kobak,²¹⁷ 9 per cent were positive.

This author found that the fetus may have a temporary bacteremia without any outward effects. The bacteremia occurs frequently as an ascending infection after prolonged rupture of the membranes.

W. A. Dafoe²¹⁸ found that 32 per cent of the morbidity in his cases were due to puerperal sepsis and in over 50 per cent of these, the *Streptococcus hemolyticus* was the causative organism. He maintains that when this organism is found in the cervical canal during the puerperium it is always a source of danger. He says that scarlet fever antitoxin has a special value in the treatment of puerperal and post-abortal cases of sepsis due to this organism.

According to H. Burt-White, L. Colebrook, G. Morgan, J. W. Jervis, and E. Harre,²¹⁹ there is a suggestion that women with positive Dick reactions show an increased susceptibility to puerperal morbidity. However in view of the comparative rarity of streptococcal infection, there is no need for the active immunization of all expectant mothers not even of all who are Dick-positive. The investigations of L. Stent²²⁰ in 500 cases show that immunity to streptococcal toxin measured by the Dick test did not decrease the liability to a morbid puerperium. H. Burt-White²²¹ treated 27 cases of puerperal sepsis with scarlet fever antitoxic serum and 29.6 per cent of the patients died. In view of these results and the reports of others the author concludes that the existing statistics for this treatment are of doubtful significance.

W. W. King²²² submits the records of 24 puerperal patients who were apparently infected from throats of attendants, and he recommends the use of masks which completely cover the mouth and nose by all persons present when the vulva is exposed during labor or the puerperium. Likewise E. F. Murray²²³ is of the opinion that an individual with an acutely septic sore throat may cause puerperal sepsis by coughing on the hands, dressings, instruments or on the patients. (These papers emphasize the necessity for masking both nose and mouth of all people who come in contact with women in labor. Likewise obstetricians should avoid contact with fresh, septic and autopsy material, bacteriology laboratories, patients who have a contagious disease, etc.)

In experimentally infected uteri of dogs, J. A. Meyer²²⁴ found that intravenous injections of acriflavine had a beneficial effect. The earlier the dye was given the better the effect. J. F. Baldwin²²⁵ has performed total hysterectomies in 90 severe cases of puerperal infection and has had a mortality of 25.5 per cent. He claims to have saved the 67 mothers who survived because they belonged to a class of patients all of whom die unless operated upon. M. Martens²²⁶ favors ligation of veins in cases of pyemia and quotes the results of his extensive experience with these cases. Martens performs this operation even when metastases are present and he favors the extraperitoneal method. (The operative treatment of puerperal sepsis has never seemed logical to the reviewer. The best results in his opinion are obtained by conservative therapy which comprises rest in bed, forced fluids, glucose, proper nourishment, sunlight, fresh air, and small, repeated, blood transfusions.)

F. Engelmann²²⁷ claims that the results in cases of diffuse puerperal peritonitis can be greatly improved by operation. In a series of 75 such cases he saved 26. J. J. Chydenius²²⁸ found that among 27 patients with generalized postabortal peritonitis who were not operated upon, all but one died. On the other hand, among the 29 on whom

operations were performed 10 recovered. A radical operation with both abdominal and vaginal drainage is recommended. Kriele²²⁹ discusses the early diagnosis and prognosis of pyemia.

A case of ergot poisoning is reported by P. Oginz.²³⁰ The patient had puerperal sepsis and had received 45 ampules of gynergen over a period of fourteen days. T. Antoine²³¹ reports two additional cases of gangrene of the extremities in febrile puerperia after the use of ergot. One patient recovered after amputation of the left leg. The author believes that sepsis with its complications was responsible for the gangrene in these cases and not ergot. (It is extremely rare for ergot to produce gangrene unless enormous amounts of it are given. In most of the reported cases where ergot or gynergen is mentioned as a possible cause, sepsis was present and this condition was more directly responsible for the gangrene than the ergot. Gynergen is an excellent hypodermic preparation of ergot. Undoubtedly Oginz' patient received entirely too much of it.)

THE NEWBORN

Physiology.—In a study of the blood platelets in 100 newborn infants J. Jarcho²³² found that in the majority of cases the number varied between 150,000 and 250,000 per c.mm. According to C. R. Corfield,²³³ the best age of expectation for male children is between twenty-four and twenty-five years of age. In order to produce male children, F. Unterberger²³⁴ recommends that the husband powder the prepuce and glans with sodium bicarbonate before having intercourse. In 53 cases where he made this recommendation, boys were born without exception. H. Fütth²³⁵ found a strongly acid secretion in the vaginas of the preponderance of women who gave birth to girls and a weakly acid or amphoteric reaction in most of those who had boys. Hence he believes his findings support Unterberger's contention. (These statements are interesting but require more corroboration before they can be accepted.)

As a result of the sensation created in the newspapers over the supposed mixing of babies in Chicago, an editorial²³⁶ appeared on the method of identifying babies which is used at the St. Louis Maternity Hospital. F. C. Irving²³⁷ describes in detail the method used at The Boston Lying-In Hospital. (A single method for the identification of newborn is always hazardous. At the Chicago Lying-In Hospital we use five different methods for this purpose.)

C. H. Davis and G. W. Stevens²³⁸ believe that a routine radiographic study of all infants might furnish data which would warrant an expense of about two dollars per infant. These authors found enlargement of the thyroid in 32.6 per cent, abnormal lung conditions in 26 per cent, and an abnormal appearance of the heart in 15 per cent.

In 16.4 per cent of 240 cistern punctures of the newborn L. H. Smith²³⁹ found bloody cistern fluids. There was a definite increase of bloody fluids in the cases where the Gwathmey method was employed. The results of this study prove the existence of a "physiologic intracranial damage" incident to labor as pointed out by Ehrenfest. Attention is called by J. R. Goodall²⁴⁰ to the fact that escaping meconium in cases of vertex presentation is not a sign of fetal distress but simply an indication that the child has suffered. The fetal cardiac action judged by its rapidity, slowness or arrhythmia is the only reliable evidence that the fetus is in actual danger. (Quite true.)

J. H. Hess, I. M. Chamberlain and E. C. Lundeen²⁴¹ report a detailed study of 761 premature infants. The most common single cause of prematurity was multiple conception. In 104 autopsies in which special attention was paid to the thymus gland only 5 cases were reported as showing marked hypertrophy. The authors emphasize that when induction of labor is contemplated obstetricians should bear in mind that every additional day of intrauterine life adds much to the infant's opportunity for good physical and mental development. (This article should be read by all obstetricians.)

Complications.—An extensive study of the fetal heart sounds by means of the phenocardiogram has demonstrated to A. S. Hyman²⁴² that the occurrence of cardiac irregularities in uterine life is not an infrequent occurrence. The author differentiates three groups of arrhythmias, only one of which, that probably due to auricular fibrillation, is clinically important.

E. N. Stahnke²⁴³ points out that intrapartum fetal asphyxia may be influenced without undertaking operative procedures in two ways, namely, by administering to the mother an anesthetic such as ether or chloroform or a cardiac stimulant such as digalen.

A study of 806 asphyxiated children in a series of 16,087 labors (4.9 per cent) was made by S. Liebmann.²⁴⁴ The fate of these children was as follows: 604 remained alive, 86 could not be resuscitated, 73 were resuscitated but died within a few hours and 43 died within ten days. Hence the total mortality was 25 per cent. H. L. Kincaid²⁴⁵ recommends the use of a tracheal catheter for the treatment of asphyxia neonatorum whereas D. P. Murphy and J. A. Coyne²⁴⁶ advocate a modified Drinker respirator for the purpose of administering prolonged artificial respiration to asphyxiated children. H. F. Kane and J. Kreiselman²⁴⁷ maintain that the proportion of CO₂ increases with the degree of asphyxia, hence the addition of CO₂ to oxygen as a resuscitating agent is contraindicated. (Practically all asphyxiated babies can be resuscitated by means of a tracheal catheter. Most of those which cannot be revived by this procedure have cerebral hemorrhage. The Drinker respirator and the Kreiselman, Kane, and Swope apparatus are very useful instruments, especially for those who are not adept with the tracheal catheter.)

An anatomical study of 32 cases of subdural hemorrhage leads W. H. Chase²⁴⁸ to the conclusion that this condition is the important intracranial lesion in most cases of birth trauma. The subdural hemorrhage is largely supratentorial and often bilateral. D. Munro²⁴⁹ discusses the symptomatology and immediate treatment of cranial and intracranial injury in the newborn, including intracranial hemorrhage, and F. C. Irving²⁵⁰ takes up the obstetric aspect of intracranial hemorrhage. The latter author states that at the Boston Lying-In Hospital, 40 per cent of 182 fetal autopsies revealed that intracranial hemorrhage was the cause of death. After cesarean section this complication occurred in 0.3 per cent, after spontaneous delivery in 0.4 per cent, after low forceps in 0.5 per cent, after midforceps in 3.0 per cent, after high forceps and breech extraction in 2.6 per cent and after version in 1.7 per cent. J. Partridge²⁵¹ believes that nearly half the infants who are alive at the commencement of labor and are born dead to healthy mothers, die solely because they have sustained intracranial injury at the time of birth.

B. Lundquist²⁵² collected from the literature 3 cases of intrathoracic and 49 cases of intraabdominal hemorrhage in the newborn. The primary etiologic factor was circulatory disturbances in the fetus as a result of labor itself and perhaps also the change in the circulation produced by the first breath of the child. In most of the cases there was an additional biologic factor such as a hemophilic tendency, as evidenced by the fact that 70 per cent of these hemorrhages occurred in male babies.

N. A. Dayton²⁵³ analyzed the psychiatric examinations of 20,473 retarded school children. He found that there appears to be little evidence that abnormal labor occurs to a greater extent in mothers of retarded or mentally defective children than in mothers of the general population. However, there is a definite association between abnormal labor and the dull normal or low normal children. This is important because the bulk of our population lies in these higher levels of intelligence. There was also an association between abnormal labor and neurologic defects. The studies of H. Krukenberg²⁵⁴ prove that birth trauma may result during normal spontaneous labor as well as during operative procedures. This author followed up 72.7 per cent of 1,147 children delivered by forceps. Among 54 delivered by high forceps, one showed permanent injuries, among 144 midforceps cases the incidence was 1.4 per cent and among 739 outlet forceps cases it was only 0.13 per cent. Of 164 children delivered by version and extraction, 5 (3.7 per cent) showed permanent evidence of birth injury. (These two papers should be read by every obstetrician because they contain a good deal of information.)

Although there is experimental evidence to prove that quinine may cause intrauterine death of the child, E. S. Sadler, W. J. Dilling, and A. A. Gemmell²⁵⁵ maintain that statistics show this risk is not greater than that of stillbirths from undiscovered causes in otherwise normal labors. Postmortem examinations on many stillborn children following quinine induction showed intracranial injuries, hence great care is necessary in selecting cases for induction of labor.

An experimental study by D. P. Murphy²⁵⁶ led to no definite conclusion regarding the influence of preconception ovarian irradiation on the development of subsequent offspring in the albino rat. It is significant, however, that no gross structural abnormalities were observed among 493 first and second generation descendants of animals which received preconception ovarian radium irradiation. However, D. P. Murphy and M. De Renyi²⁵⁷ performed experiments with post-conception irradiation and observed deformities among the young of the animals which were irradiated when pregnant and these deformities have not been duplicated in a series of 125,000 nonirradiated control animals. L. Goldstein²⁵⁸ studied the records of 19 microcephalic feeble-minded children irradiated in utero with special reference to ophthalmic defects. Data were available concerning the condition of the eyes in 15 children and in 12 of them there existed serious ophthalmic abnormalities. The author is of the opinion that although defects of the optic apparatus have been observed in nonradiogenic microcephaly, the increased frequency, severity, and uniformity of the changes observed in the radiogenic form point clearly to irradiation as the specific cause. F. L. Adair²⁵⁹ found that malformations occurred in 1.98 per cent of 354 twin pregnancies and in 2.3 per cent of almost

25,000 single pregnancies at the Chicago Lying-In Hospital. Adair analyzes 15 twins with malformations.

THE PLACENTA

F. Curtius²⁶⁰ studied the placentas and also 42 different bodily characteristics of 56 twins to identify identical twins. He concludes that two chorions do not necessarily indicate double ovum twins and conversely single ovum twins are not always monochorionic. Bodily similarity is more important in determining single and double ovum twins than the condition of the membranes. Whether twins will have one or two chorions does not depend alone on whether they originate from one or two ova but more upon the location in which the ova are implanted. (Curtius is not alone in his opinion and there is a good deal of evidence to support it.)

The investigations of A. Hermstein²⁶¹ show that the resistance of fetal membranes is not equal throughout. They are least resistant near their lower pole and their strength increases as the placenta is approached. The amnion is stronger than the chorion. On the other hand the chorion is more impervious to the passage of water because the amnion readily permits the passage of liquor even when it is intact. Bacteria have difficulty traversing the membranes because the chorion is very resistant to them. F. Summervill and V. E. Campbell²⁶² studied the placentas and membranes in 325 consecutive obstetric cases and found evidence of acute inflammation in 16.9 per cent. The incidence was higher in cases with a prolonged second stage of labor and in cases with complications which required operative procedures.

MISCELLANEOUS

It is the belief of H. E. Collier²⁶³ that certain changes in the last twenty years have operated to render the average confinement of today just as dangerous as, if not more dangerous than it was twenty years ago. P. W. Toombs²⁶⁴ maintains that in this country one mother out of every 150 dies in labor or shortly thereafter and furthermore for every patient who succumbs, ten are seriously ill. Toombs discusses the conditions responsible for the mortality and morbidity and also ways of reducing their incidence. The British Ministry of Health appointed a committee to investigate maternal mortality and morbidity and this committee analyzed 2,000 maternal deaths. As a result of this study,²⁶⁵ a number of very important recommendations were made. According to F. Rothbert, Kentucky in 1927 had the next to the lowest maternal mortality among all the States. However, the rate among the colored women was more than twice as high as that for the white women. (This racial difference is one of the facts to be considered by those who maintain the United States has the highest maternal mortality rate among civilized nations. Another fact to be remembered is that some countries make a distinction which was brought out in the British report just mentioned, namely, the separation of deaths into those directly due to pregnancy and childbearing including abortion and ectopic pregnancy and deaths due to an independent concurrent disease. The reports of the United States make no such distinction. Our mortality is no less than it was thirty years ago in spite of the great advances made in medicine and surgery. It is true that we prevent many deaths by proper prenatal care but what

we gain in this way we lose during labor because of the tremendous increase in the number of obstetric operations performed not only by specialists but also by general practitioners.)

J. Ronsheim and I. Daichman²⁶⁶ found the maternal death rate to be 4.5 per thousand in a series of 24,217 deliveries. They emphasize that 88 per cent of all these deaths were preventable. F. L. Adair and M. S. Sichel²⁶⁷ contrast a maternal death rate of 0.51 per cent for 5,911 confinement cases with a rate of 2.04 per cent of 1,272 cases of abortion. Puerperal sepsis was responsible for 43.3 per cent of the labor cases and for 84.6 per cent of the abortion cases.

C. E. Mongan²⁶⁸ takes up the subject of maternal statistics and points out the fallacies of those who constantly tell us that the maternal death rate in the United States is so much worse than it is everywhere else. He emphasizes the fact that although nearly every civilized country is supposed to use the same rules in collecting and compiling vital statistics, there is evidence that it is utterly futile except perhaps in one instance to try to compare the maternal death rates of one country with another. This is due to the unreliable methods and differences in gathering facts. Mongan makes a number of suggestions and emphasizes that it is the duty of the medical profession not unduly to alarm the public with statements based upon uncertain, unreliable, and untrustworthy figures. (This excellent article should be read by every physician and should be reprinted in some lay magazine to counteract the statements made by well-meaning but overenthusiastic and misinformed pseudoreformers.)

Some phases of modern obstetrics are discussed by M. A. Tate,²⁶⁹ and G. W. Kosmak²⁷⁰ writes on sensible standards of proper obstetric care. M. E. Davis²⁷¹ points out the value of motion pictures as an aid in the teaching of obstetrics, and H. Forssner²⁷² takes up the sterilization problem in Scandinavia. Forssner points out that the penal codes of all the Scandinavian countries regard it as a felony to deprive anyone of his or her power of reproduction. The law makes no exception even for medical indications but the courts do not enforce this law against physicians because the purpose of sterilization operations is not to break the law but to help patients.

A. L. Robinson²⁷³ exposes the fallacy of the belief that a woman who has successfully borne several children does not need careful supervision. In a survey of deaths he found that the mortality risk for a woman of forty is three times as great as that of a primipara of eighteen. He points out the complications to which multiparas are especially exposed.

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Selected Abstracts

Sterility

Meaker, S. R.: The Fundamental Nature of Relative Sterility. *New England J. Med.* 201: 160, 1929.

In practically every case the cause of sterility is a sum-total of multiple factors, rather exceptionally it is a single abnormality. Responsibility is to some extent divided between the male and the female in at least 90 per cent of cases. Intelligent management of sterility, therefore, requires in every case a complete study of both partners, dealing with constitutional as well as local conditions.

EHRENFEST.

Meaker, Samuel R., and Glaser, William: The Hydrogen-Ion Concentration of the Endocervical Secretions. *Surg. Gynec. Obst.* 48: 73, 1929.

The vaginal reaction is ordinarily unimportant in relation to fertility and sterility. It is not always negligible, however, for in occasional cases an excessive vaginal acidity may cause sterility.

The cervical reaction is constantly and definitely alkaline, ranging from P_H 8.0 to P_H 9.0 and being above P_H 8.5 in about 80 per cent of cases.

The cervical reaction is not notably influenced by age, parity, the menstrual cycle, endocervicitis, or viscosity of the endocervical mucus. In pelvic hypoplasia it may possibly be less alkaline than in normally developed cases.

WM. C. HENSKE.

Rio, Luigi: The Vitamin E of Fertility. Influence of the Absence of Vitamin E on the Internal Genitalia and on the Endocrine System. *Arch. di ostet. e ginec.* 16: 711, 1929.

Rats of both sexes under a basal diet lacking in vitamin E, became sterile. Histologic examination made on every organ, shows modification only on the sexual glands, on the endocrine glands and on the uterus.

Both in the testicles and in the ovaries an extensive degeneration of the germinal epithelium is found; in the endometrium signs of atrophy are seen, and in the endocrine glands hypertrophy and hyperplasia are observed.

Such alterations do not happen in animals whose diet is supplemented with one or two drops of oil of wheat, bearer of a vitamin which is specific for the sexual function.

SYDNEY S. SCHOCHET.

JULIUS E. LACKNER.

Holtz, F.: The Frequency of Pregnancy in Women Who Have Had Salpingo-oophoritis. *Acta obst. et gynec. Scandinav.* 8: 88, 1929.

It is generally believed that pregnancy is rare among women who have had salpingo-oophoritis. Holtz studied a series of 1306 cases of this disease in which sepsis was responsible for 102, gonorrhea for 402, tuberculosis for 44, while in 748 cases no definite cause could be found. Ninety per cent of the patients were fol-

lowed up and it was found that 137 out of 807 or 17 per cent who were not operated upon conceived. The incidence of pregnancy for the married women in the septic group was 31.2 per cent, for the gonorrheal group it was 22.8 per cent and for those with unknown etiology it was 25.4 per cent. For the whole group there was a total of 127 deliveries and 35 abortions. The frequency of pregnancy was lower in the cases where large masses were palpable. Of 48 women in whom the adnexa were removed on only one side, 13 or 29.5 per cent later became pregnant. Of the married women 42.3 per cent later conceived.

The author concludes that contrary to the common belief, conception is not rare after salpingo-oophoritis and sterility does not always follow gonorrheal salpingitis even where large masses are present.

J. P. GREENHILL.

Katz, H.: Infantilism and Sterility. *Wien. klin. Wchnschr.* 42: 1030, 1929.

Genital infantilism is found in 3.5 per cent to 5 per cent of women and is one of the main causes of sterility. The entire genital tract including the breasts may be hypoplastic or only one or several parts of the tract involved. One finds a prominent mons pubis, funnel-shaped contracted vulva, perineum extending a considerable distance downward, short and narrow rigid vagina with markedly developed mucous membrane, small cylindrical or long conically pointed portio vaginalis, uterine displacements, and disproportion between uterine body and cervix, all as signs of hypoplasia. The cervix especially shows marked changes. It is long, rigid, and narrow, and a markedly viscid gelatinous plug almost hermetically seals the external os making it impossible for the spermatozoa to get through. Functional abnormalities may also contribute to cause sterility in these cases as an irregular or too infrequent ovulation, although its importance has not yet been determined. Hypoplasia of the tubes may be another cause.

Treatment is directed toward building up the underdeveloped tissues. Change of climate and general hygienic measures; heat locally in the form of hot air, diathermy, hot packs, and sun baths; coitus correctly carried out and at regular intervals; hormone therapy by mouth or, in severe cases, ovarian implantation; operative procedures such as dilatation of the os and abrasion of the mucous membrane, are recommended. Ensuing gravidity may end in abortion, but often stimulates development of the uterus to normal so that later pregnancies may be carried to term.

FRANK SPIELMAN.

Macomber, Donald, and Sanders, Morris B.: The Spermatozoa Count. *New England J. Med.* 200: 981, 1929.

The authors counted spermatozoa in the usual counting chamber, using as diluent a solution of 5 per cent sodium bicarbonate to which one per cent of formalin has been added.

In trying to establish what amounts to a normal count they found that the largest number of cases would show about 100 million spermatozoa per c.c. Investigations in regard to total number in ejaculation lead them to the conclusion that this figure seemingly is of less significance in relation to fertility than the concentration. This concentration apparently increases with advancing age, beginning to decline gradually in the decade between forty and forty-nine years. There exists a direct relation between size of testis and volume of semen. In the large majority of spermatozoa the head lengths were relatively uniform. In sperms of low concentration there was markedly more variation in head lengths. Spermatozoa count gives identical information as to fertility as does head length measurements, the

former representing the by far simpler method. Pregnancy is not impossible with counts as low as 60 million but the chances probably are slight without further increase by treatment (prostatic massage). Spermatozoa count has been of value not only in the diagnosis of fertility but also in gauging the effect of treatment, that is, as well in prognosis.

EHRENFEST.

Graff, E.: Diagnosis and Treatment of Sterility. Wien. klin. Wchnschr. 42: 1378, 1929.

It was found that in only 10 per cent of 200 sterility cases studied was the male at fault. In the female the causes for sterility fall into 3 groups: hypoplasia, infection, and position changes. The frequent association of hypoplasia and infection, as occurred in one-third of the cases, is an indication of the susceptibility of hypoplastic organs, making operative procedures inadvisable.

The importance of the Rubin test both in diagnosis and treatment is stressed. Of 43 cases, 14 or 32.6 per cent became pregnant immediately following the procedure. Intercourse within twenty-four hours is recommended. Repeated insufflations, however, have not been productive of results, and as there is danger of infection are to be avoided. Dilatation and curettage although sometimes efficacious in isolated cases are to be employed only occasionally. Posterior discission can be done where there is retroversion of a hypoplastic uterus, preventing contact between sperma and external os. In general, abnormal versions and flexions should be corrected. Results of plastics on closed tubes have been most gratifying where the closure was at the interstitial portion. For hypoplasia the usual hydro- and physiotherapeutic measures as well as glandular extracts are recommended.

FRANK SPIELMAN.

Giles, Arthur E.: The Diagnosis and Treatment of Sterility. Brit. M. J. 2: 647, 1928.

The author limits his subject to sterility of the woman.

Correct diagnosis of female sterility depends on a thorough and systematic investigation of anatomic features that affect transit of spermatozoa from the vagina to the fallopian tube, possibility of fertilization of the ovum, and transfer of the fertilized ovum from ovary to uterus.

Often an undersized uterus associated with infrequent scanty menstruation may represent a delayed, not an arrested, development and in such a case stimulus of marriage offers most successful treatment.

Pronounced obesity seems to be antagonistic to reproductive activity; it is a matter of clinical experience that fat sterile women become fertile when fat has been reduced.

To obviate difficulty in intercourse, a rigid hymen must be incised and a narrowed vaginal orifice dilated under general anesthesia, or enlarged by plastic operation.

For unduly contracted os, cervical canal is dilated. For marked ante flexion of cervix, he advises moderate dilation of cervical canal and introduction of a glass intrauterine stem pessary which is left for ten to twelve days, during which time patient must stay in bed. Retroversion or retroflexion are corrected and a Hodge pessary used if necessary.

Noxious discharges are properly treated.

For tubal obstruction surgical measures are necessary.

Basal metabolism must be done and blood morphology studied on both husband and wife.

ADAIR-CURRAN.

Walker, Kenneth: *Diagnosis and Treatment of Sterility in the Male.* Brit. M. J. 2: 652, 1928.

Out of 57 men referred to the author by gynecologists only 25 were considered absolutely normal. Of the 32 deficient ones, 18 were absolutely sterile, 6 showed marked impairment of fertility and 8 minor degrees. Examination of semen of these 57 cases showed: normal healthy semen in 25; oligospermia in 2; oligozoospermia in 6; oligonecrozoospermia in 6, and azoospermia in 18.

Various conditions affecting output of spermatozoa from tubules are: infections—orchitis, epididymitis and infections elsewhere in body; endocrine disturbances; absence of special vitamin E; and bilateral retained testicles.

The method of artificial insemination in treating sterility has been successful in the hands of veterinary surgeons but not of gynecologists. This may be explained by differences in technic. In veterinary practice, insemination is preceded by sexual stimulation. In human beings, patients are often inseminated while under anesthesia, with no preliminary stimulation, no outpouring from accessory sexual glands.

Surgery is of little help for correction of stenosis, whether in epididymis or ejaculatory ducts.

Endocrine therapy may help in cases of aspermatogenesis. Anterior lobe pituitary extracts should be used for six months. In cases of hypothyroidism thyroid extract is administered.

ADAIR-CURRAN.

Willbrand, L.: *The Results of Tubal Insufflation in Sterility.* Monatschr. f. Geburtsh. u. Gynäk. 84: 63, 1930.

In a series of 406 cases of sterility, Willbrand found that 271 were primary and 135 secondary cases of sterility. The tubes were closed in 17 per cent of the primary cases and in 14 per cent of the secondary ones. The chief cause of sterility in the primary group was hypoplasia and this was found in 38 per cent. Inflammatory changes were detected in only 14.3 per cent.

In the cases of secondary sterility the cause was a previous inflammation in 24.4 per cent, of which 30.7 per cent had their origin in puerperal infection.

Tubal insufflation gives more information in sterility than any other test. The author never saw any serious complications following this procedure. Pregnancy followed tubal insufflation in 21 per cent of the primary sterility cases, and in 30 per cent of the secondary sterility cases. The curettement which was performed at the same time helped considerably.

J. P. GREENHILL.

Mayer, A.: *Treatment of Sterility by Tubal Insufflation.* München. med. Wehnschr. 39: 1627, 1929.

Mayer reports his results in 406 cases of sterility treated by insufflation of gas. He emphasizes the usual precautions in the selection of cases. In doing the test, he limits the pressure to 150 mm. of mercury. Of the 271 cases of primary sterility, 17 per cent were nonpatent, and 21 per cent subsequently conceived. Of the 135 cases of secondary sterility, 14 per cent were nonpatent, and 30 per cent subsequently conceived. Among these, 48 per cent of the cases of secondary sterility after a previous abortion became pregnant. Mayer feels that, in addition to the establishment of patency by the gas, the test has a favorable effect which is due to the unavoidable abrasion of the mucosa. This, in some way, seems to favor conception, either by stimulating the growth of the uterus or favoring the nidation of the ovum. He cites as support of this assumption the fact that 27

per cent of 103 cases of uterine hypoplasia conceived after this test, while the general average in the whole group was 21 per cent.

The author feels that tubal insufflation is of value, primarily, as a diagnostic measure; that the establishment of tubal patency is but one of the many factors concerned in the study of sterility; and that a successful test by no means ensures subsequent pregnancy.

A. SHULMAN.

Vignes, H.: Artificial Fecundation. *Progrès méd.* 44: 1646, 1929.

The author gives a thorough analysis of this subject. He points out the preliminary precautions necessary before insemination is undertaken and indicates that the proper time in the menstrual cycle for this is as near the period of ovulation as possible. Insemination must be repeated frequently to obtain good results. There are four methods of collecting the sperm, namely, masturbation into a sterile glass, coitus interruptus, coitus condomatus, and natural coitus followed by aspiration from the vagina. The sperm should be injected undiluted beyond the internal os into the uterine cavity. The technic is described in detail by the author and he also takes up the male and female indications and also the contraindications for the procedure. He quotes the results obtained by various authors.

J. P. GREENHILL.

Kakuschkin, N.: Transplantation of the Fallopian Tubes From One Woman to Another. *Monatschr. f. Geburtsh. u. Gynäk.* 85: 19, 1930.

The author has transplanted the fallopian tubes from one woman to another in five instances. Each tube was removed with the entire uterine horn and with the corresponding ovary. Likewise, in the recipient, the diseased tube with the uterine horn was cut away. In the cases where no tube was present at the time of operation, the mesosalpinx and infundibulo-pelvic ligament were freshened. To obtain fresh specimens the operations on both the donor and the recipient were performed simultaneously on two adjoining tables. Only the large blood vessels were ligated. The postoperative convalescence was not without complications.

J. P. GREENHILL.

Nishizaki: Tubal Sterilization Through the Uterine Cavity. *Japanese J. Obst. & Gynec.* 12: 285, 1929.

The author used his electrocoagulation apparatus in 14 uteri of which 12 had been removed from multiparas. He maintains that only superficial cauterization is accomplished on the tubal opening by Dickinson's electric cautery method of sterilization. Nishizaki, however, attempts to produce complete obstruction of the tubal opening with his own apparatus which extends for a depth of 7 mm. into the intramural segment of the tube.

J. P. GREENHILL.

Forssner: The Sterilization Problem in Scandinavia. *Acta obst. et gynec. Scandinav.* 9: 150, 1930.

The penal codes of all the Scandinavian countries regard it as a felony to deprive anyone of his or her power of reproduction. The law makes no exceptions even for operations performed by physicians for medical indications. The courts however, do not enforce this law against the medical profession. In spite of this fact physicians and lawyers believe that a special law is advisable because it is doubtful whether the existing law will be interpreted in the same way for steriliza-

tion operations done for social-medical reasons. The author sees no necessity for such a new law and mentions that he has performed 37 sterilization operations during the last three years. He believes the existing laws under the protection of an enlightened judiciary body are satisfactory.

J. P. GREENHILL.

Corrections

In Dr. Ehrenfest's White House Conference report, "Factors and Causes of Fetal, Newly Born, and Maternal Morbidity and Mortality," in the June number, page 868, line 9 from the top, reads: The Children's Bureau estimates that of all abortions in this country 50 per cent are criminally induced, 37 per cent spontaneous, and the remaining 13 per cent therapeutic.

This statement is not quite correct since these percentages do not pertain to *all* abortions but only to abortions which in this study of the Children's Bureau have been found to precede puerperal deaths.

In the April issue of the JOURNAL, on page 554, there is presented a quotation by Dr. W. F. Nelms in an article on placenta previa as follows: "Douglass and Siegel report 14 cesarean sections in their series, with no maternal mortality, but their fetal mortality was 90 per cent." This quotation is correct except for the fetal mortality, which was only 7.14 per cent.

In the article by Stein, Eight Years' Experience With Roentgen Diagnosis in Gynecology, which appeared on page 671, May, 1931, issue, Figs. 3-A and 4 appeared upside down.

Dr. John Osborn Polak

While going to press the distressing news reaches us of the unexpected death of Dr. John Osborn Polak, of Brooklyn, N. Y., a valued member of the Editorial Board of this JOURNAL since its existence.

The Editors.



John Osborn Polak
1870-1931